Stormwater Report

for

Balsam Estates

0 Kimberlee Avenue
Franklin, MA

Date: January 3, 2025

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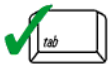
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Dale MacKinnon 1/3/25

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

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NARRATIVE

This report was prepared on behalf of the applicant, Joel D'Errico. The project development area is 179,164 +/- sf. (4.113 +/-Ac.) owned by Lorena R. Fitzgerald and being developed by the applicant. The project area is a currently existing vacant, wooded parcel located at the northeastern end of Kimberlee Avenue. The property is bordered by conservation land to the north and east, and single family residential homes to the west and south. The site is located within the Rural Residential II zoning district and has site access from Kimberlee Avenue. The site does not lie within a FEMA flood zone, Franklin water resource district, or wetland resource area buffer.

PROJECT DESCRIPTION

The Applicant is proposing to construct a two lot subdivision with common driveway and associated landscaping, utilities, and grading. Drainage infrastructure associated with the new development will also be constructed. The topography consists of slopes ranging from 0% to 10% grade, with an area of steeper grades along the southwestern property line.

DESCRIPTION OF EXISTING DRAINAGE

The pre-developed site drains principally from northeast to southwest, with approximately 5.37 acres of woodland and existing developed residential land draining overland and flowing across the project parcel to the southwest, eventually draining to the existing residential properties on Madison Avenue, AP-2. Additionally, 0.50 acres of contributing area, consisting of woodland and runoff from #36 Kimberlee Avenue, flows overland and collects at the northwest property corner before flowing off the project parcel to the northwest, AP-1. These hydrologic areas are shown on the Pre-Development Watershed Plan attached to this report and are denoted as EX-1 through EX-2.

DESCRIPTION OF PROPOSED DRAINAGE FACILITIES

The proposed drainage system to manage stormwater from the proposed development consists of vegetated filter strips and infiltration basins for detention and infiltration. Stormwater from lawns, driveways, and roofs flows overland to one of two proposed infiltration basins for treatment, detention, and infiltration.

In the Post-Development condition, four hydrologic areas were considered. These watershed areas consider the building, driveway, lawns, and drainage facilities proposed to be constructed. These hydrologic areas are shown on the Post-Development Watershed Plan attached to this report and are denoted as PR-1 through PR-4.

PR-2 and PR-3 contain that land which drains directly to Infiltration Basins 1 and 2, respectively. Pavement and other impervious areas flow overland and are conveyed to the infiltration basins for treatment, detention, and infiltration. During the 100 year storm, excess stormwater is discharged from the basins via the overflow spillaways to the two analysis points AP-1 and AP-2.

PR-1 and PR-4 contain that land within the project area that is not captured by the two infiltration basins, and instead flows overland directly to their respective analysis points. These catchments do not include any impervious surfaces.

This report documents design compliance with the applicable sections of the Massachusetts Stormwater Management Standards 1-10.

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Stormwater Design Parameter:

The stormwater management system was designed to control the post-development rate of peak rainfall runoff from the site by keeping it below the post-development peak rate of rainfall runoff as stated as the objective in the Massachusetts Stormwater Handbook. The calculations were performed using the HydroCAD hydraulic program, developed by applied Microcomputer System. The HydroCAD software is based upon the Soil Conservation Service, "Technical Release 55 – Urban Hydrology for Small Watersheds" and is generally accepted industry methodology.

The analysis was performed for the 2-year, 10-year, 25-year, and 100-year 24-hour storm events.

The following data was required for input:

- Watershed Area: Areas of each watershed were calculated and expressed in square feet for these calculations.
- SCS Curve Number (Cn): Based on the cover type and hydrologic soil group, a weighted curve number (CN) was determined for each of the existing watersheds utilizing Table 2-2a- *Runoff Curve Numbers For Urban Areas* and *Worksheet 2, Runoff Curve Number and Runoff* from the Soil Conservation Service Technical Release 55 – Urban Hydrology for Small Watersheds.
- Time of Concentration, Tc (Minutes): The time of concentration for each watershed was determined by finding the time necessary for runoff to travel from the hydraulically most distant point in the watershed to the point of analysis. This was calculated by using a minimum time of 6 minutes for runoff to reach the most distant catch basin.
- SCS 24-Hour Storm Type: For the greater New England region, a Type III storm rainfall distribution is recommended for drainage calculations and was used for this project.
- Rainfall Precipitation: Rainfall precipitations used the Atlas-14 Volume 10, Version 3 rainfall estimates for the site, obtained from the NOAA Precipitation Frequency Data Server (PFDS) for the 2, 10, 25, and 100 year storm events and are as follows:

2-year storm event:	3.39 inches
10-year storm event:	5.25 inches
25-year storm event:	6.41 inches
100-year storm event:	8.19 inches

In an effort to develop the project utilizing LID stormwater infrastructure, stormwater is conveyed overland by sheet flow and swales, and no catch basins or other conventional pipe based infrastructure are proposed. Accordingly, no rational pipe sizing calculations are required.

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Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

All Paved area runoff from the proposed site will sheet flow across the pavement areas, pass over grass filter strips, and discharge to one of two proposed infiltration basins. No new untreated stormwater discharges are proposed.

Standard 2: Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

To meet Standard 2, the post-development peak discharge rate must be equal to or less than pre-development rates to prevent storm damage and downstream and offsite flooding from the 2-year and the 10-year 24-hour storm events.

Peak discharge rates were calculated and evaluated at two analysis points. The points of evaluation are shown on the accompanying watershed plans.

In summary of the attached drainage analysis (HydroCAD), the peak discharge rates at the point of evaluation in cubic feet per second (cfs) are as follows;

		Run off		
	Storm Events	Pre-dev. (cfs)[af]	Proposed (cfs)[af]	Change (cfs)[af]
Analysis Point 1 (AP-1)	2-year	(0.00)[0.000]	(0.00)[0.000]	(-0.00)[-0.000]
	10-year	(0.00)[0.002]	(0.00)[0.003]	(-0.00)[0.001]
	25-year	(0.00)[0.007]	(0.03)[0.008]	(0.03)[0.001]
	100-year	(0.10)[0.021]	(0.42)[0.066]	(0.32)[0.045]

		Run off		
	Storm Events	Pre-dev. (cfs)[af]	Proposed (cfs)[af]	Change (cfs)[af]
Analysis Point 2 (AP-2)	2-year	(0.10)[0.040]	(0.00)[0.000]	(-0.10)[-0.040]
	10-year	(0.90)[0.215]	(0.01)[0.004]	(-0.89)[-0.211]
	25-year	(1.90)[0.351]	(0.05)[0.009]	(-1.85)[-0.342]
	100-year	(4.30)[0.667]	(1.60)[0.131]	(-2.70)[-0.536]

Please note that while AP-1 does see a slight increase in post development runoff resulting from the 100 year storm, AP-1 discharges to undeveloped woodland with an extensive wetland network. This minor increase (0.045af), when distributed across the downgradient wetlands (with an approximate area in excess of 9.8 acres), would raise the standing water elevation by less than 0.06 inches. Accordingly, we respectfully request that this increase be considered de minimis.

In addition, we note that discharges to the southern abutting residential properties (AP-2) have been significantly reduced in both flow rate and volume for all storm events, providing a tangible benefit to those properties in the form of a reduction in potential flooding during large rain events. We feel this

configuration provides the greatest benefit to the town and neighboring properties, while preserving the intent of state and local stormwater bylaws and regulations.

Standard 3: Loss of annual recharge to ground water shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Soil Evaluation

Soil evaluation is broken down into two stages. Stage 1 identifies the underlying soils just beneath the surface that contribute to how much runoff is generated as stormwater falls and moves across the surface. Stage 2 evaluates the soils in direct contact with the proposed infiltration BMPs. The attachments section includes the NRCS Soil Survey used for Stage 1 while the site plan set includes the on-site soil textural analysis in the specific locations that infiltration is proposed. The information from the NRCS Soil Survey is included on the Pre and Post Development Watershed Plans.

Recharge Volume

The required recharge volume is determined by calculating the impervious area proposed over the corresponding soil identified in the NRCS Soil Survey. Soils underlying the site are defined as map units 300B Montauk Fine Sandy Loam (HSG C), and 310B Woodbridge Fine Sandy Loam (HSG C/D), 420C Canton Fine Sandy Loam (HSG B).

Table 2: Required Recharge Volume Calculation

	Recharge	**Impervious**	**Volume**
Hydrologic Group	(in/sqft)	(sqft)	(cf)
A - *sand*	0.60	9,539.6	477.0 cf
B - *loam*	0.35	1,219.7	35.6 cf
C - *silty loam*	0.25	0	0
D - *clay*	0.10	0	0
		Required Recharge Volume Total	**512.6 cf**

Stormwater Basin Sizing

There are three ways of determining the recharge volume provided by a storm water basin (Static, Simple Dynamic and Dynamic Field). The Static Method, used here, includes the volume of water that can be stored beneath the lowest outlet of the basin. This, the most conservative method of determining the recharge volume, doesn't account for any infiltration that takes place while the basin is filling with water and is less dependent on maintenance of the basin since the only way for the water below the lowest invert can leave the basin is though infiltration. The following table summarizes the recharge volume provided by the infiltration chambers. Detailed volume calculations for the basin are included in the attachments.

Table 3: Basin Recharge Volumes

	Recharge Volume
Basin 1 @ 295.50	8,990 cf
Basin 2 @293.85	5,450 cf
Total	14,440 cf

72-hour Drawdown

When using the conservative Static Method to determine infiltration volume provided, the Rawls Rate is used to represent the infiltration rate in place of a hydraulic conductivity rate. The specific rate chosen is based on the textural analysis of the in-site soil performed by a competent soil professional.

A Massachusetts Certified Soil Evaluator performed an evaluation of the soil at the proposed infiltration BMP. The soil textural analysis for the infiltration BMP is listed below with the associated Rawls Rate used in the HydroCAD calculations. Where textural analysis varied within any single BMP, the most restrictive textural evaluation and Rawls Rate were used. Soil logs of the in situ soil evaluation are included within the Site Plan set. A conservative rawl's rate of 1.02 in/hr, consistent with a sandy loam soil, was used to account for the poor soils mapped throughout the site.

Table 4: Rawls Rate

	Most Restrictive Soil Texture	Rawls Rate (in/hour)
Infiltration Basin #1	Loamy Sand	2.41 in/hr
Infiltration Basin #2	Loamy Sand	2.41 in/hr

Drawdown time for the infiltration chamber systems is modeled by HydroCAD and included in the attachments. The following table summarizes the drawdown time for the basin to show it will drawdown within the 72-hour maximum.

Table 5: Basin Drawdown

	Time for Drawdown
Chamber System 1	32 hours
Chamber System 2	28 hours

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

- ***a) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;***
- ***b) Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and***
- ***c) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.***

The Water Quality Volume requiring 80% TSS removal, is calculated as follows:

The required water quality volume is based on 1.0" as the soil recharge rate is 2.41 in/hr, meeting the threshold rate of 2.4 in/hr or greater. The water quality volume equals 1.0 inches of runoff times the increased impervious area of the post-development site.

Existing Site Impervious Area	=	0 sf
Proposed Site Impervious Area	=	10,759 sf
Total Site Impervious Area Increase	=	10,759 sf
Impervious area to be treated	=	**10,759 sf**

Total volume to be treated:
1.0" x 1'/12" x 10,759 sf = 896.6 **cf Water Quality Volume Required**

Provided Water Quality Volume:

Treatment volume (infiltration basin #1) = 8,990 cf @ el. 295.50 Outlet Elevation

Treatment volume (infiltration basin #2) = 5,450 cf @ el. 293.85 Outlet Elevation

See TSS Removal Calculations in Attachment Section.

MS4 Bylaw Compliance:

Based on the Town of Franklin MS4 stormwater bylaw as specified in § 153-16 (B)(1)(a), new developments require the on-site stormwater management systems to be designed to retain the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area, and/or remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post construction impervious area on site and 60% of the average annual load of Total Phosphorous (TP) generated from the post construction impervious surface area on site.

The total impervious area, including roofs, is 10,759 square feet. The equivalent 1" of runoff from these surfaces is 896.6 cubic feet. The total storage provided below the lowest inverts out are as follows. See Appendix 5 – Stage -Area-Storage calculations.

Basin 1 @ Elev. 295.50 = 8,990 cf

Basin 2 @ Elev. 293.85 = 5,450 cf

Total Storage Volume Required = 896.6 cf

Standard 4: requires the development and implementation of suitable practices for source control and pollution prevention. These measures must be identified in a long-term pollution prevention plan.

The long-term pollution prevention plan is incorporated into the Operation and Maintenance Plan required by Standard 9.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed project is not a use with higher potential pollutant loads.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

The subject property discharges stormwater within the Medway Groundwater Protection District. Due to rapid recharge rates present in the infiltration chambers, the Water Quality Volume is calculated using the required 1.0" rule, and 44% TSS removal is achieved prior to discharge to the infiltration chambers. See Standard 4 for computations. The design utilizes stormwater BMPs designated as suitable for critical areas within the Massachusetts Stormwater Handbook. No metal roof is proposed.

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable:

This project is not a redevelopment project and meets all applicable stormwater standards.

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Standard 8: A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

During land disturbance and construction activities, project proponents must implement controls that prevent erosion, control sediment movement, and stabilize exposed soils to prevent pollutants from moving offsite or entering wetlands or waters. Land disturbance activities include demolition, construction, clearing, excavation, grading, filling, and reconstruction.

Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control.
EPA NPDES – Storm Water Pollution Prevention Plan (SWPPP)

A. Names of Persons or Entities Responsible for Plan Compliance

Joel D'Errico
72 Deerview Way
Franklin, MA 02093
Tel: 508-439-0022
Email:Joelwderrico@gmail.com

B. Construction Period Pollution Prevention Measures

1. Inventory materials to be present on site during construction.
2. Train employees and subcontractors in prevention and clean up procedures.
3. All materials stored on site will be stored in their appropriate containers and if possible under a roof or covered.
4. Follow manufacturer's recommendation for disposal of used containers.
5. Store only enough products on site to do the job.
6. On site equipment, fueling and maintenance measures:
    a. Inspect on-site vehicles and equipment daily for leaks.
    b. Conduct all vehicle and equipment maintenance and refueling outside of 100' wetland buffer, away from storm drains.
    c. Perform major repairs and maintenance off site.
    d. Use drip pans, drip cloths or absorbent pads when replacing spent fuels.
    e. Collect spent fuels and remove from site, per Local and State regulations.
    f. Maintain a clean construction entrance; install a crushed stone apron where truck traffic is frequent to reduce soil compaction constant sweeping is required and limit tracking of sediment into streets, sweeping street when silt is observed on street.
7. A temporary concrete washout station and equipment wash station shall be located on the site. Areas shall be surrounded with a silt fence and or Filter Mitt to contain materials and provide ease of cleanup.
8. Stock pile materials, and maintain Erosion Control around the materials where it can easily be accessed. Maintain easy access to clean up materials to include brooms, mops, rags gloves, goggles, sand, sawdust, plastic and metal trash containers.
9. Clean up spills.
    a. Never hose down "dirty" pavement or impermeable surfaces where fluids have spilled. Use dry cleanup methods (sawdust, cat litter and/or rags and absorbent pads).
    b. Sweep up dry materials immediately. Never wash them away or bury them.

c. Clean up spills on dirt areas by digging up and properly disposing of contaminated soil in a certified container and notify a certified hauler for removal.
d. Report significant spills to the Fire Department.

10. It is the responsibility of the site superintendent or employees designated by the Applicant to inspect erosion control and repair as needed, also to inspect all on site vehicles for leaks and check all containers on site that may contain hazardous materials daily.

C. Site Development Plans
1. See Site Plan set "Definitive Subdivision Plan of Land, Balsam Estates" dated October 17, 2024 and revised through 1/7/2024, prepared by Guerriere & Halnon, Inc.

D. Construction Erosion and Sedimentation Control Plan;
1. See Site Plan set "Definitive Subdivision Plan of Land, Balsam Estates" dated October 17, 2024 and revised through 1/7/2024, prepared by Guerriere & Halnon, Inc.

E. Plans
1. Construction Sequencing Plan
a. A NPDES NOI shall be filed with the EPA.
b. Prior to any work on the site including tree/brush clearing, the approved limit of clearing as well as the location of the proposed erosion control devices (such as silt fence/straw bales, etc.) must be staked on the ground under the direction of a Massachusetts registered Professional Land Surveyor.
c. Install erosion control barriers at locations depicted on the plans.
d. Erosion control to be inspected by either the design engineer (or agent) or an erosion control monitor appointed by the Town of Franklin.
e. Extra erosion control devices (at least 10% of the linear footage required for the site) shall be stored on the site to be used in case of an emergency (large storm).
f. Perform tree/brush removal.
g. Strip off top and subsoil. Stockpile material to be reused away from any drainage inlet or protected wetland areas, remove excess material from the site. Install and maintain erosion control barrier around stockpile.
h. Rough grade site, maintaining temporary low areas/sediment traps for sediment accumulation and away from the wetlands (if present) and prevent sedimentation from migrating from the site.
i. Construct infiltration basins. Stabilize side slopes with loam, seed and mulch.
j. Install underground utilities; protect all open drainage structures with erosion/siltation control devices, and rope off any areas susceptible to heavy vehicle damage.
k. Prepare compacted pavement base.
l. Loam and seed (mulch as required) disturbed areas of site other than immediately adjacent to work area.
m. Upon all catchment structures and mitigation features becoming operational, install pavement up to binder finish grade. Straw bales backed by crushed stone to be provided on down gradient side of catch basins to direct water to temporary basin.
n. Install final pavement wearing course.
o. Begin construction of homes.
p. Finish grade - loam and seed (mulch as required adjacent to parking lot.

q. Maintain all erosion control devices until site is stabilized and final inspections are performed.

The Contractor shall be responsible to schedule any required inspections of his/her work.

2. Construction Waste Management Plan
   a. Dumpster for trash and bulk waste collection shall be provided separately for construction.
   b. Recycle materials whenever possible (paper, plaster cardboard, metal cans). Separate containers for material are recommended.
   c. Segregate and provide containers for disposal options for waste.
   d. Do not bury waste and debris on site.
   e. Certified haulers will be hired to remove the dumpster container waste as needed. Recycling products will also be removed off site weekly.
   f. The sewer system is only for disposal of human waste.

F. Operation and Maintenance of Erosion and Sedimentation Controls

The operation and maintenance of sedimentation control shall be the responsibility of the contractor. The inspection and maintenance of the storm water component shall be performed as noted below. The contractor shall, at all times have erosion control in place. The contractor, based on future weather reports shall prepare and inspect all erosion control devices; cleaning, repairing and upgrading is a priority so that the devices perform as per design. Inspect the site during rain events. **Don't stay away from the site.** At a minimum, there should be inspection to assure the devices are not clogged or plugged, or that devices have not been destroyed or damaged during the rain event. After a storm event inspection is required to clean and repair any damage components. Immediate repair is required.

G. Inspection and Maintenance Schedules

1. Inspection must be conducted at least once every 7 days and within 24 hours prior to and after the end of a storm event 0.25 inches or greater.
2. Inspection frequency can be reduced to once a month if:
   a. The site is temporarily stabilized.
   b. Runoff is unlikely due to winter conditions, when site is covered with snow or ice.
3. Inspections must be conducted by qualified personnel, "qualified personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls and who possess the skills to assess the conditions and take measures to maintain and ensure proper operation, also to conclude if the erosion control methods selected are effective.
4. For each inspection, the inspection report must include:
   a. The inspection date.
   b. Names, titles of personnel making the inspection.
   c. Weather information for the period since the last inspection.
   d. Weather information at the time of the inspection.
   e. Locations of discharges of sediment from the site, if any.
   f. Locations of BMP's that need to be maintained.
   g. Locations where additional BMP's may be required.
   h. Corrective action required or any changes to the SWPPP that may be necessary.
5. Qualified personnel shall inspect the following in-place work;

Inspection Schedule:

Erosion Control	Weekly
Catch Basins	Weekly
Temporary Sedimentation Traps/Basins	Weekly
Pavement Sweeping	Weekly

Please Note: Special inspections shall also be made after a significant rainfall event.

Maintenance Schedule

Erosion Control Devices Failure	Immediately
Temporary Sedimentation Traps/Basins	As needed
Pavement Sweeping	14 days minimum and prior to any significant rain event.

Please Note: Special maintenance shall also be made after a significant rainfall event.

H. Inspection and Maintenance Log Form.

1. See Construction Phase Inspection and Maintenance Form attached

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Standard 9: A Long –Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that storm water management systems function as designed.

The following shall serve as the (O&M) Plan required by Standard 9, as well as the Long-Term Pollution Prevention Plan required by Standard 4.

A. Names of Persons or Entities Responsible for Plan Compliance;

Joel D'Errico
72 Deerview Way
Franklin, MA 02093
Tel: 508-439-0022
Email:Joelwderrico@gmail.com

It is the intent of the Applicant to have the site completed and released by the various town Departments and Boards.

B. Good housekeeping practices
1. Maintain site, landscaping and vegetation.
2. Sweep and pick up litter on pavements and grounds.
3. Deliveries shall be monitored by owners or representative to ensure that if any spillage occurs, it shall be contained and cleaned up immediately.
4. Maintain pavement and curbing in good repair.

C. Requirements for routine inspections and maintenance of stormwater BMPs
1. Plans: The storm water Operation and Maintenance Plan shall consist of all Plans, documents and all local state and federal approvals as required for the subject property.
2. Record Keeping:
   a. Maintain a log of all operation and maintenance activities for at least three years following construction, including inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location);

3. Descriptions and Designs: The Best Management Practices (BMP) incorporated into the design include the following;
   a. Pavement Sweeping – Stipulated within the Construction Period Pollution Prevention Plan, the Long Term Pollution Prevention Plan, and the Operation and Maintenance Plan. As the amount of TSS removal is discretionary, no credit was taken within the calculations for this BMP.
   b. Vegetated Filter Strip –surface pretreatment device which receive runoff from adjacent impervious surfaces. Vegetated Filter Strips provide 10% TSS removal as pretreatment prior to discharge to the infiltration BMP.
   a. Infiltration Basins: Preventative maintenance shall be performed at least twice per year. Inspection shall be performed after every major storm for the first three months and twice a year thereafter and when there are discharges through the high outlet orifice. Mowing of the buffer area, and bottom of basin; removal of trash and debris; removal of grass clippings and organic matter to be performed at least twice per year. Pretreatment devices shall be inspected every other month and a least twice a year and after every major storm event.
   c. Spill Containment Kit to contain and clean-up spills that could occur on site.

4. BMP Maintenance: After construction it is the responsibility of the owner to perform maintenance. The owner shall also be responsible for the maintenance of the existing stormwater BMPs on the abutting Walgreens property. The cleaning of the components of the stormwater management system shall generally be as follows:
    b. Pavement: The owner shall keep the pavement swept with a mechanical sweeper or hand swept semi-annually at a minimum.
    c. Vegetated Filter Strips: Inspect semi-annually in the first year, annually thereafter. Regular and frequent mowing required. Remove any sediment buildup observed during inspections.
    d. Infiltration Basins: Inspect for proper function after every major storm event during the first 3 months of operation, inspect/remove debris twice per year afterward. Mow basin at least twice per year, remove clippings.

5. Access Provisions: All of the components of the storm water system will be accessible by the Owner

D. Spill prevention and response plans
1. Train employees and subcontractors in prevention and clean up procedures.
2. All materials stored on site will be stored in their appropriate containers under a roof or in the approved underground storage tanks.
3. No hazardous materials are to be stored outside.
4. Follow manufacturer's recommendation for disposal of used containers.
5. On site equipment, fueling and maintenance measures:
    a. Inspect on-site vehicles and equipment daily for leaks.
    b. Conduct all vehicle and equipment maintenance off Site and refueling in one location, away from storm drains and wetlands. No vehicle washing is allowed on impervious surfaces draining into the stormwater management system, and is recommended for pervious vegetated areas only.
6. Clean up spills.
    a. Never hose down "dirty" pavement or impermeable surfaces where fluids have spilled. Use dry clean-up methods (sawdust, cat litter and/or rags and absorbent pads).
    b. Sweep up dry materials immediately. Never wash them away or bury them.
    c. Clean up spills on dirt areas by digging up and properly disposing of contaminated soil.
    d. Report significant spills to the Fire Department, Conservation Commission and Board of Health.
    e. Floatables shall be promptly and completely removed from catch basins, water quality units, and other drainage structures following a spill.

E. Provisions for maintenance of lawns, gardens, and other landscaped areas
Dispose of clippings away from storm drainage, wetland resource areas, and their buffers.

F. Requirements for storage and use of fertilizers, herbicides, and pesticides
The application of fertilizers, herbicides, or pesticides will be done by professional certified contractor. Only slow release, organic options are permitted for use within wetland jurisdictional buffer areas. Storage these chemicals is not permitted with 100' of the wetland resource area.

G. Provisions for solid waste management

1. Waste Management Plan
   a. Recycle materials whenever possible (paper, plaster cardboard, metal cans). Separate containers for material is recommended.
   b. Do not bury waste and debris on site.
   c. Certified haulers will be hired to remove the dumpster container waste as needed. Recycling products will also be removed off site weekly.
   d. No hazardous waste are to be disposed of in the on-site dumpster, and must be disposed of in accordance with all applicable regulations.

H. Snow disposal and plowing plans

Snow storage areas are designated on the site plan. No snow is to be stored within wetland resources, stormwater management areas, or parking spaces. Snow storage signs are to be provided adjacent to the wetland resource area as shown on the site plan. Excess snow that cannot be stored within the designated snow storage areas is to be removed and disposed of off-site within 72 hours.

I. Winter Road Salt and/or Sand Use and Storage restrictions

No sand, salt, or chemicals for de-icing will be stored outside. No de-icer shall be used without the authorization of the Medway Conservation Commission. Calcium Chloride is proposed for use as the primary de-icing chemical.

J. Pavement sweeping schedules

Sweeping, the act of cleaning pavement can be done by mechanical sweepers, vacuum sweeper or hand sweeper. The quantity of sand is a direct correlation with the treatment of ice and snow and the types of chemicals and spreaders that are being used on site to manage snow. If a liquid de-icer such as calcium chloride is used as a pretreatment to new events the amount of sand is minimized. Sweeping for this site should be done semi-annually at a minimum. Collecting the particulate before it enters the catch basins is cheaper and more environmentally friendly than in a catch basin mixing with oils and greases in the surface water runoff in catch basins.

K. Provisions for prevention of illicit discharges to the stormwater management system

The discharge into the stormwater system is not being violated, see attachment for illicit discharges compliance.

L. Training the staff or personnel involved with implementing Long-Term Pollution Prevention Plan The owner shall develop policies and procedures for containing the illicit spilling of oils, soda, beer, paper, and litter. These wastes provide a degrading of the water quality. The placement of signs and trash barrels with lids around the site would contribute to clean water quality site conditions.

M. List of Emergency contacts for implementing Long-Term Pollution Prevention Plan:

Joel D'Errico
72 Deerview Way
Franklin, MA 02093
Tel: 508-439-0022
Email:Joelwderrico@gmail.com

BMP	Estimated Maintenance Cost
Pavement sweeping	$ 400 per year
Catch basin cleaning	$ 200 per catch basin per cleaning
Separator Row / Infiltration Chambers	$ 500 per cleaning
Spill Containment Kit	$ 750 purchase price

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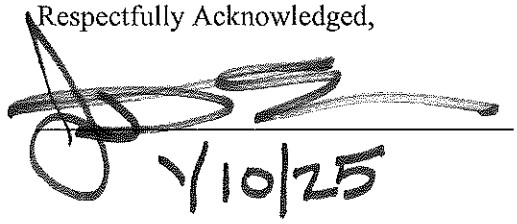
Standard 10: All illicit discharges to the stormwater management system are prohibited.

Standard 10 prohibits illicit discharges to stormwater management systems. The stormwater management system is the system for conveying, treating, and infiltrating stormwater on site, including stormwater best management practices and any pipes intended to transport stormwater to the ground water, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

Illicit Discharge Compliance Statement

It is the intent of the Joel D'Errico, 72 Deerview Way, Franklin, MA 02093 to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease. There will be no connection to the storm water system to inadvertently direct other types of liquids, chemicals or solids into the storm drainage system. The Owner will also promote a clean Green Environment by mitigating spills onto pavements; oils, soda, chemicals, pet waste, debris and litter.

Respectfully Acknowledged,



ATTACHMENTS

Pre- Post Drainage Plans

104C
HOLLIS–ROCK OUTCROP–CHARLTON COMPLEX
HSG D

103D
CHARLTON–HOLLIS–ROCK OUTCROP COMPLEX
HSG A

422D
CANTON FIINE SANDY LOAM
HSG B

N/F
TOWN OF FRANKLIN

N/F
CHRISTOPHER B. & LISA B.
BRADY

N/F
KENT WROBLESKI &
KENDRE BETRO

N/F
FELICE N. & SHELBY P.
MAGLIARI

N/F
JOSH L. &
ERIN M LECHTER

N/F
THOMAS POWDERLY–
TRUSTEE
THOMAS POWDERLY

N/F
KEVIN P. & SUZANNE M.
GRADY

KIMBERLEE
AVENUE
(PUBLIC ~ 56' WIDE)

SIMONE LANE
(56' WIDE)

EXISTING
HOUSE
#36

EXISTING
HOUSE
#35

EXISTING
HOUSE
#18

EXISTING
HOUSE
#14

AP-1

AP-2

EX-1

EX-2

N 2864552.83
E 680891.70

N 2864543.27
E 681491.20

N88°43'13"E 79.40'

N61°43'11"E 467.55'

S61°02'04"E 199.50'

S27°24'23"E 210.17'

S59°48'19"W 193.59'

S59°30'13"W 229.02'

S58°58'25"W 15.71'

N30°46'29"W 121.82'

N19°46'46"W 229.93'

N52°23'21"W 10.80'

8"CLDI

8"W

LEGEND

⊞	CATCH BASIN	☼	LIGHT POLE
Ⓓ	DRAIN MANHOLE		UTILITY POLE
Ⓔ	ELECTRIC MANHOLE		GUY WIRE
	SEWER MANHOLE		SIGN
○	MANHOLE		WETFLAG
GV	GAS VALVE		
	GAS SHUT OFF VALVE		
WV	WATER VALVE		
	WATER SHUT OFF VALVE	x 000.0	SPOT ELEVATION
	FIRE HYDRANT		

MASSACHUSETTS STATE PLANE
NAD83 (NAD2011)
(EPOCH 2010.00)

F4631

LEGAL NOTES

UTILITIES ARE PLOTTED AS A COMPILATION OF RECORD DOCUMENTS, MARKINGS AND OTHER OBSERVED EVIDENCE TO DEVELOP A VIEW OF THE UNDERGROUND UTILITIES AND SHOULD BE CONSIDERED APPROXIMATE. BEFORE MAKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. ADDITIONAL UTILITIES, NOT EVIDENCED BY RECORD DOCUMENTS OR OBSERVED PHYSICAL EVIDENCE, MAY EXIST. CONTRACTORS (IN ACCORDANCE WITH MASS.G.L. CHAPTER 82 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING AND CALL DIGSAFE AT 1(888)DIG–SAFE{7233}.

CONSTRUCTION ON THIS LAND IS SUBJECT TO ANY EASEMENTS, RIGHTS–OF–WAY, RESTRICTIONS, RESERVATIONS, OR OTHER LIMITATIONS WHICH MAY BE REVEALED BY AN EXAMINATION OF THE TITLE.

OWNER

LORENA R. FITZGERALD
441 MAPLE STREET
FRANKLIN, MA 02039

A.M. 242 LOT 27
DEED BK. 35754 PG. 562

APPLICANT

JOEL D'ERRICO
72 DEERVIEW WAY
FRANKLIN, MA 02038

DEFINITIVE SUBDIVISION PLAN OF LAND BALSAM ESTATES FRANKLIN MASSACHUSETTS

PRE–DEVELOPMENT WATERSHED PLAN

JANUARY 3, 2024

DATE	REVISION DESCRIPTION

GRAPHIC SCALE: 1"=40'

0 10 20 30 40 50 75 100 FEET
0 5 10 15 20 30 METERS

Guerriere & Halnon, Inc.
ENGINEERING & LAND SURVEYING
55 WEST CENTRAL ST. PH. (508) 528–3221
FRANKLIN, MA 02038 FX. (508) 528–7921
www.gandhengineering.com

SHEET 1 OF 2

JOB NO. F4631

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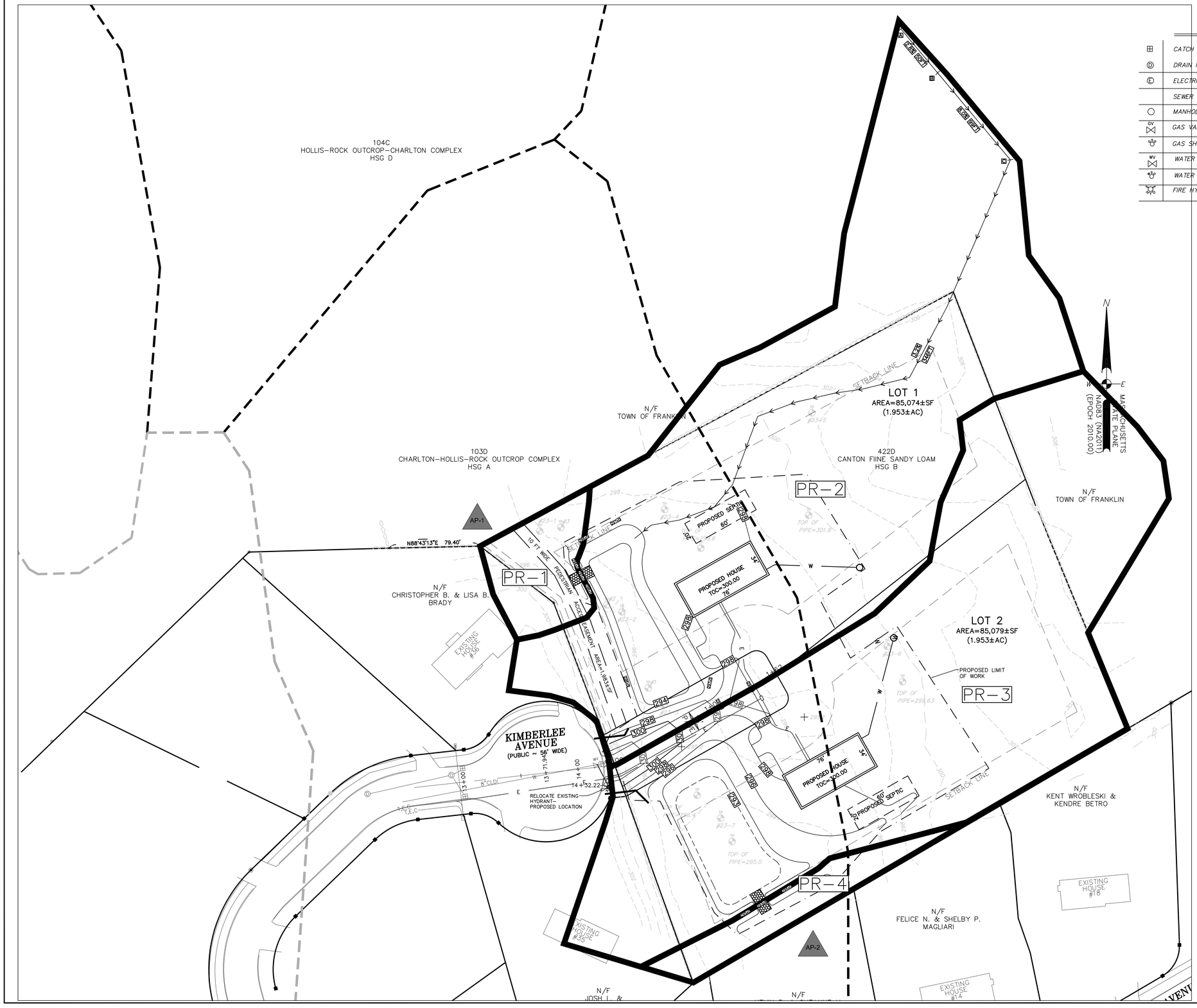

LEGEND

⊞	CATCH BASIN	☼	LIGHT POLE
Ⓓ	DRAIN MANHOLE		UTILITY POLE
Ⓔ	ELECTRIC MANHOLE	•	GUY WIRE
	SEWER MANHOLE		SIGN
○	MANHOLE		WETFLAG
GV ⋈	GAS VALVE		
	GAS SHUT OFF VALVE		
WV ⋈	WATER VALVE		
	WATER SHUT OFF VALVE	x 000.0	SPOT ELEVATION
	FIRE HYDRANT		

F4631

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UTILITIES ARE PLOTTED AS A COMPILATION OF RECORD DOCUMENTS, MARKINGS AND OTHER OBSERVED EVIDENCE TO DEVELOP A VIEW OF THE UNDERGROUND UTILITIES AND SHOULD BE CONSIDERED APPROXIMATE. BEFORE EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. ADDITIONAL UTILITIES, NOT EVIDENCED BY RECORD DOCUMENTS OR OBSERVED PHYSICAL EVIDENCE MAY EXIST. CONTRACTORS (IN ACCORDANCE WITH MASS.G.L. CHAPTER 82 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING AND CALL DIGSAFE AT 1(888)DIG–SAFE{7233}.

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OWNER

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A.M. 242 LOT 27
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APPLICANT

JOEL D'ERRICO
72 DEERVIEW WAY
FRANKLIN, MA 02038

DEFINITIVE SUBDIVISION PLAN OF LAND BALSAM ESTATES FRANKLIN MASSACHUSETTS

POST–DEVELOPMENT WATERSHED PLAN

JANUARY 3, 2024

DATE	REVISION DESCRIPTION

GRAPHIC SCALE: 1"=40'

0 10 20 30 40 50 75 100 FEET
0 5 10 15 20 30 METERS

Guerriere & Halnon, Inc.
ENGINEERING & LAND SURVEYING
55 WEST CENTRAL ST. PH. (508) 528–3221
FRANKLIN, MA 02038 FX. (508) 528–7921
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SHEET 2 OF 2

JOB NO. F4631

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Hydro CAD Calculations

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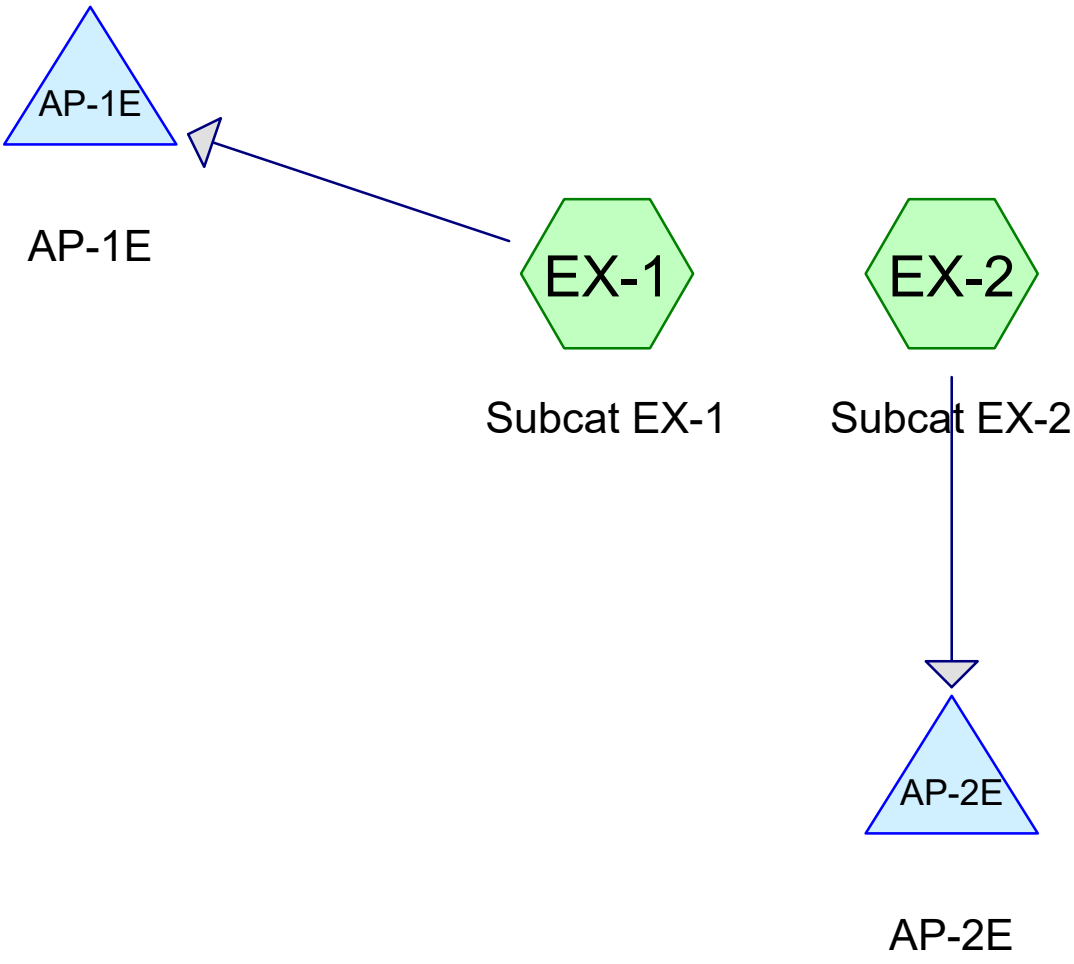


Subcat Reach Pond Link

Routing Diagram for PreDevelopment 10-16-24
Prepared by Guerriere & Halnon Inc, Printed 1/3/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.341	54	1/2 acre lots, 25% imp, HSG A (EX-1, EX-2)
1.818	30	Woods, Good, HSG A (EX-1, EX-2)
3.708	55	Woods, Good, HSG B (EX-2)
5.867	**47**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.159	HSG A	EX-1, EX-2
3.708	HSG B	EX-2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.867		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.341	0.000	0.000	0.000	0.000	0.341	1/2 acre lots, 25% imp	EX-1, EX-2
1.818	3.708	0.000	0.000	0.000	5.525	Woods, Good	EX-1, EX-2
2.159	**3.708**	**0.000**	**0.000**	**0.000**	**5.867**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=21,842 sf 4.82% Impervious Runoff Depth=0.00"
Flow Length=248' Tc=16.5 min CN=35 Runoff=0.0 cfs 0.000 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=233,721 sf 1.14% Impervious Runoff Depth=0.09"
Flow Length=985' Tc=32.3 min CN=48 Runoff=0.1 cfs 0.040 af

Pond AP-1E: AP-1E Inflow=0.0 cfs 0.000 af
Primary=0.0 cfs 0.000 af

Pond AP-2E: AP-2E Inflow=0.1 cfs 0.040 af
Primary=0.1 cfs 0.040 af

Total Runoff Area = 5.867 ac Runoff Volume = 0.040 af Average Runoff Depth = 0.08"
98.54% Pervious = 5.782 ac 1.46% Impervious = 0.085 ac

Summary for Subcatchment EX-1: Subcat EX-1

[45] Hint: Runoff=Zero

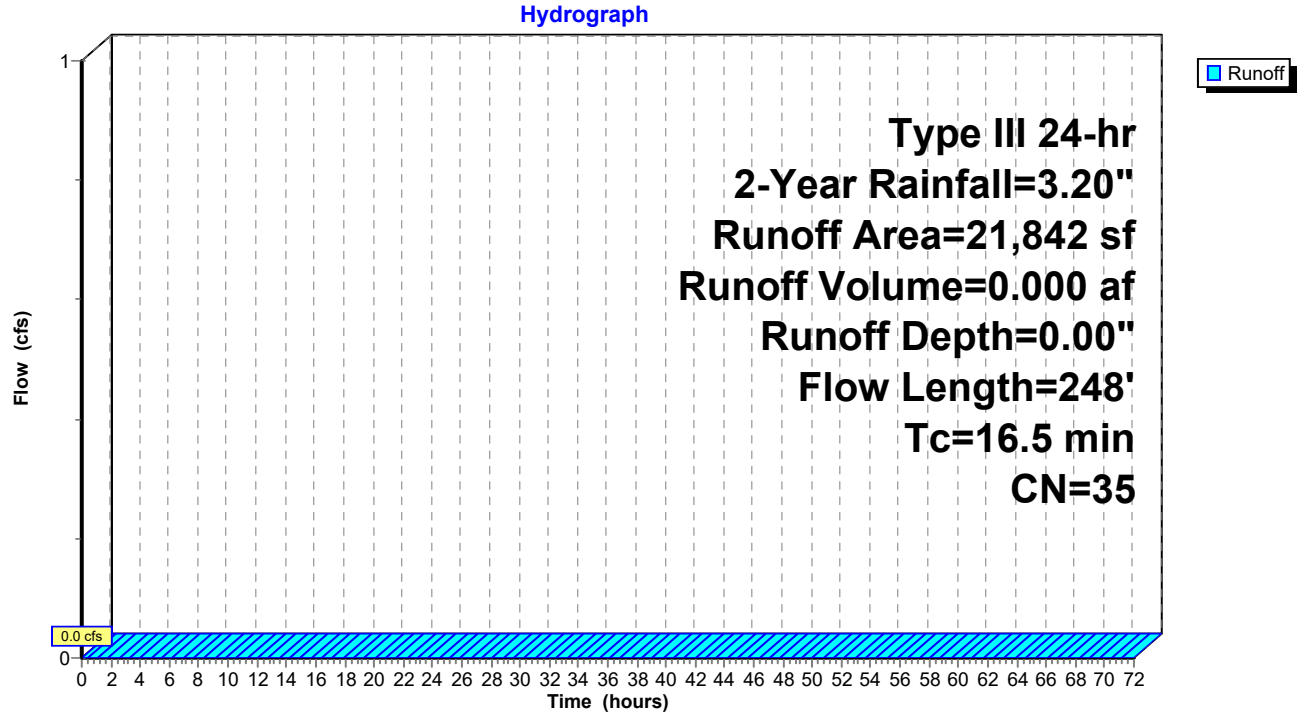
Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond AP-1E : AP-1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
4,208	54	1/2 acre lots, 25% imp, HSG A
17,634	30	Woods, Good, HSG A
21,842	35	Weighted Average
20,790		95.18% Pervious Area
1,052		4.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow, A-->B** Woods: Light underbrush n= 0.400 P2= 3.22"
5.4	198	0.0152	0.62		**Shallow Concentrated Flow, B-->C** Woodland Kv= 5.0 fps
16.5	248	Total			

Subcatchment EX-1: Subcat EX-1



Summary for Subcatchment EX-2: Subcat EX-2

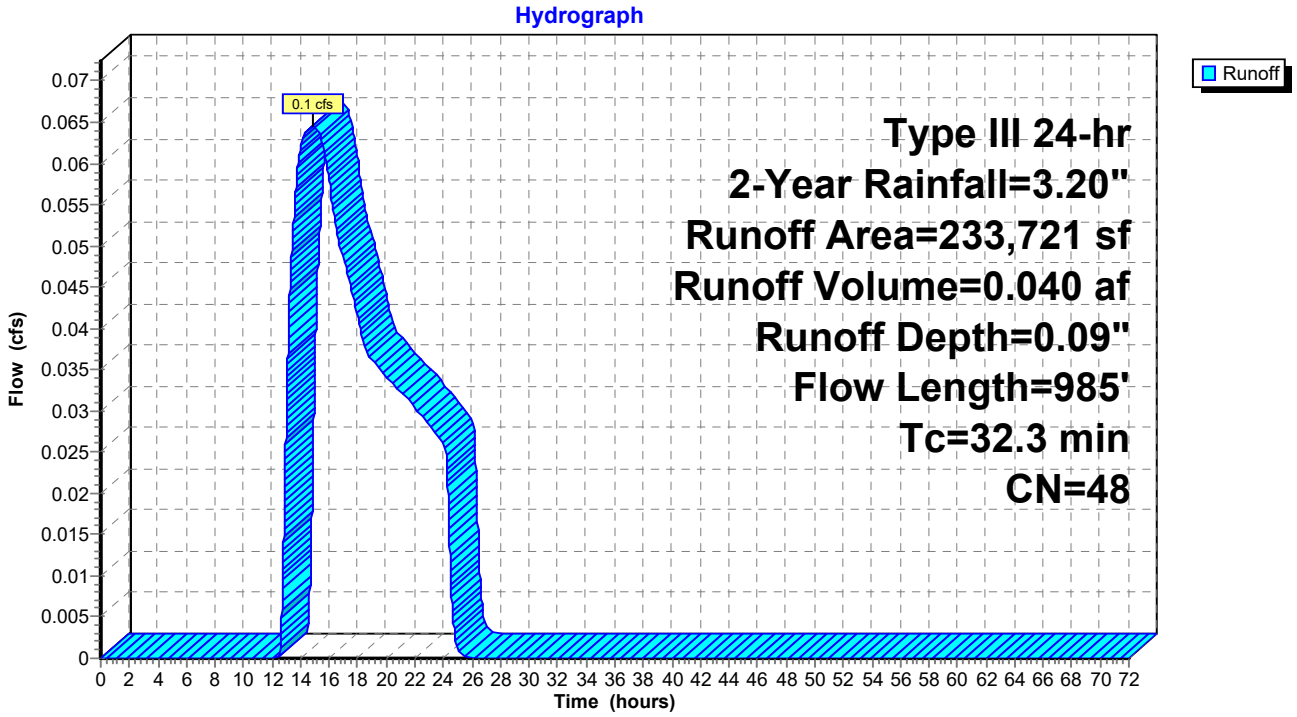
Runoff = 0.1 cfs @ 14.89 hrs, Volume= 0.040 af, Depth= 0.09"
Routed to Pond AP-2E : AP-2E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
10,667	54	1/2 acre lots, 25% imp, HSG A
61,545	30	Woods, Good, HSG A
161,509	55	Woods, Good, HSG B
233,721	48	Weighted Average
231,054		98.86% Pervious Area
2,667		1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0340	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.22"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.4	346	0.0321	0.90		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.8	490	0.0122	0.55		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
32.3	985	Total			

Subcatchment EX-2: Subcat EX-2



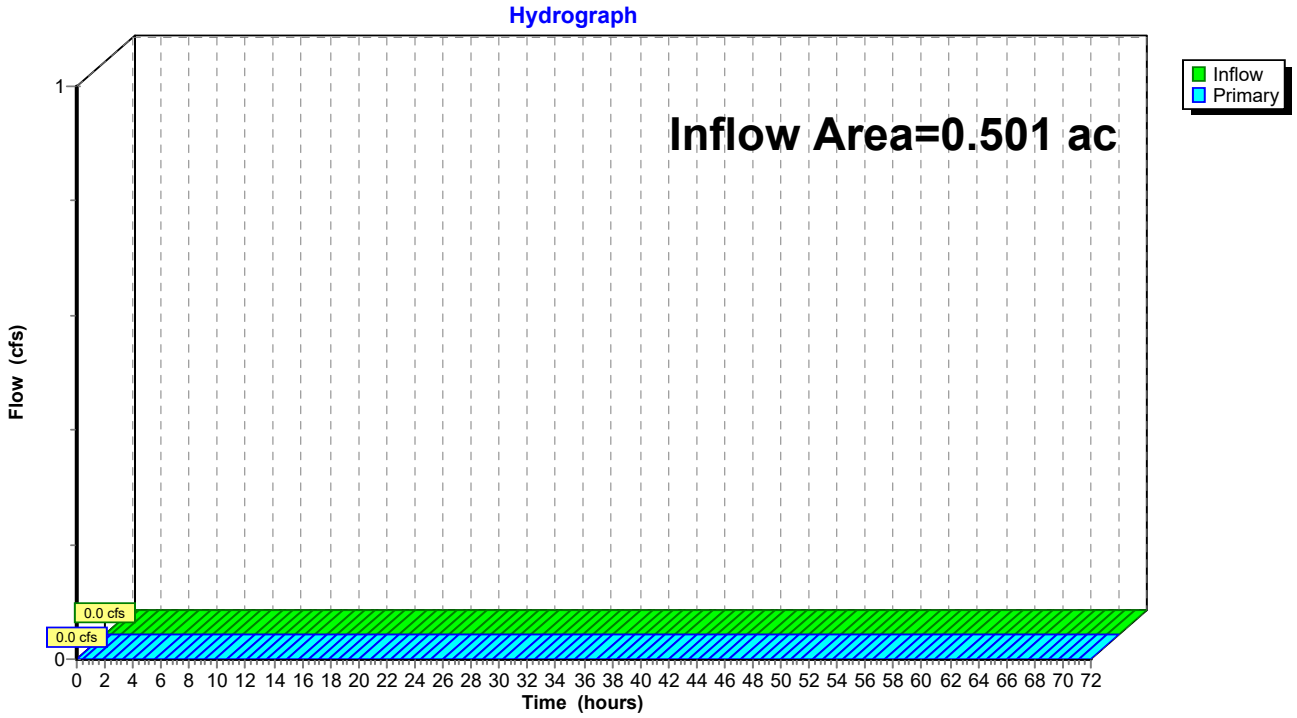
Summary for Pond AP-1E: AP-1E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.501 ac, 4.82% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-1E: AP-1E



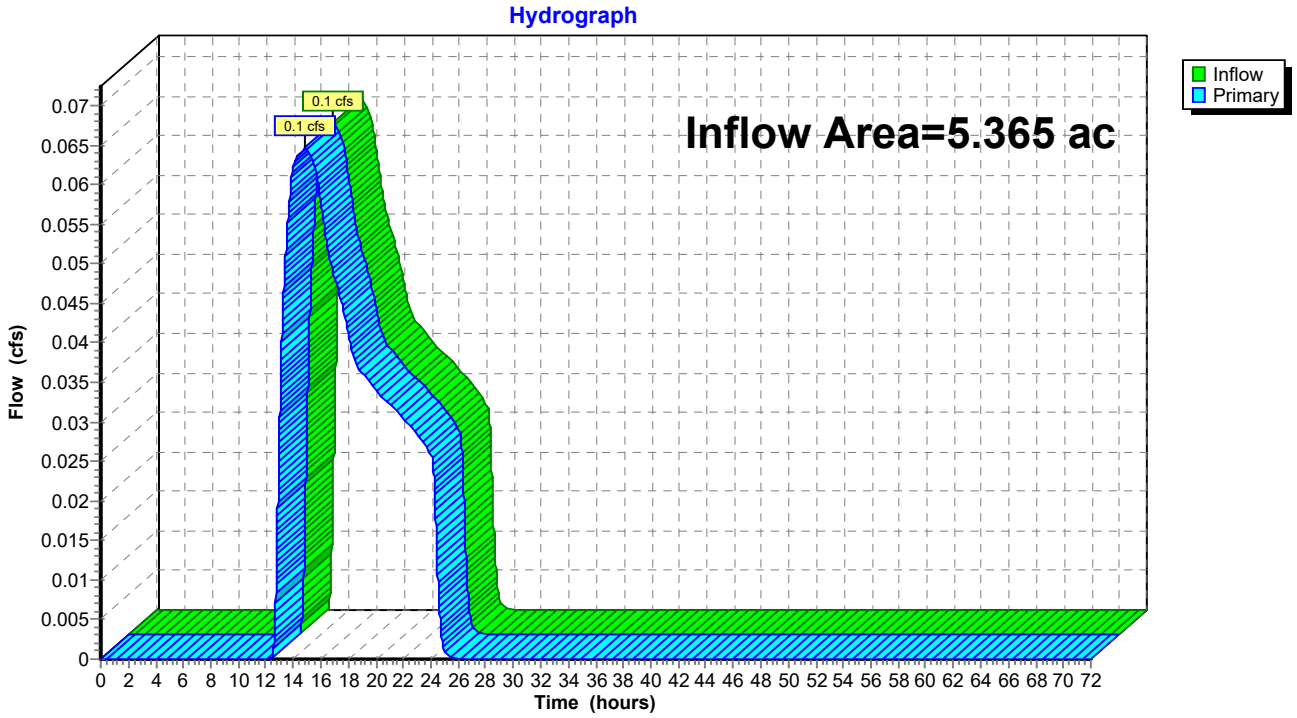
Summary for Pond AP-2E: AP-2E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.365 ac, 1.14% Impervious, Inflow Depth = 0.09" for 2-Year event
Inflow = 0.1 cfs @ 14.89 hrs, Volume= 0.040 af
Primary = 0.1 cfs @ 14.89 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-2E: AP-2E



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=21,842 sf 4.82% Impervious Runoff Depth=0.05"
Flow Length=248' Tc=16.5 min CN=35 Runoff=0.0 cfs 0.002 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=233,721 sf 1.14% Impervious Runoff Depth=0.48"
Flow Length=985' Tc=32.3 min CN=48 Runoff=0.9 cfs 0.215 af

Pond AP-1E: AP-1E Inflow=0.0 cfs 0.002 af
Primary=0.0 cfs 0.002 af

Pond AP-2E: AP-2E Inflow=0.9 cfs 0.215 af
Primary=0.9 cfs 0.215 af

Total Runoff Area = 5.867 ac Runoff Volume = 0.217 af Average Runoff Depth = 0.44"
98.54% Pervious = 5.782 ac 1.46% Impervious = 0.085 ac

Summary for Subcatchment EX-1: Subcat EX-1

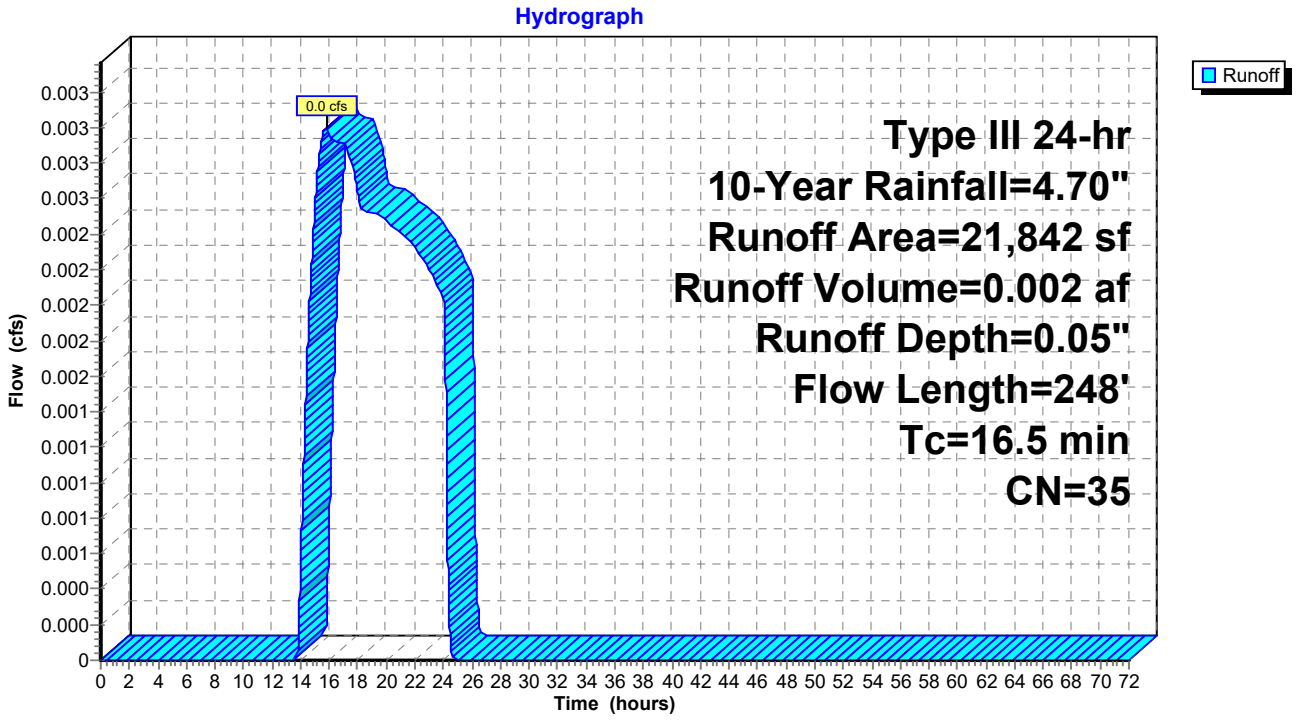
Runoff = 0.0 cfs @ 15.82 hrs, Volume= 0.002 af, Depth= 0.05"
Routed to Pond AP-1E : AP-1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
4,208	54	1/2 acre lots, 25% imp, HSG A
17,634	30	Woods, Good, HSG A
21,842	35	Weighted Average
20,790		95.18% Pervious Area
1,052		4.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow, A-->B** Woods: Light underbrush n= 0.400 P2= 3.22"
5.4	198	0.0152	0.62		**Shallow Concentrated Flow, B-->C** Woodland Kv= 5.0 fps
16.5	248	Total			

Subcatchment EX-1: Subcat EX-1



Summary for Subcatchment EX-2: Subcat EX-2

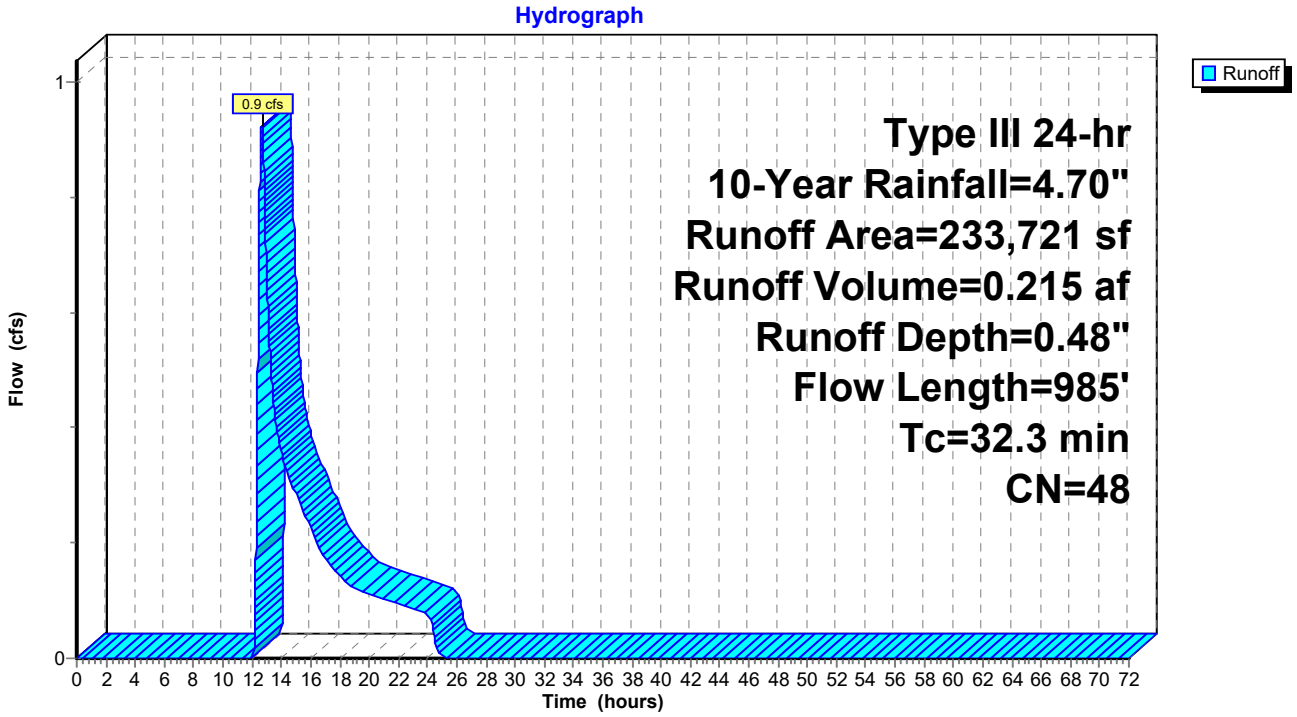
Runoff = 0.9 cfs @ 12.67 hrs, Volume= 0.215 af, Depth= 0.48"
Routed to Pond AP-2E : AP-2E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
10,667	54	1/2 acre lots, 25% imp, HSG A
61,545	30	Woods, Good, HSG A
161,509	55	Woods, Good, HSG B
233,721	48	Weighted Average
231,054		98.86% Pervious Area
2,667		1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0340	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.22"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.4	346	0.0321	0.90		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.8	490	0.0122	0.55		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
32.3	985	Total			

Subcatchment EX-2: Subcat EX-2



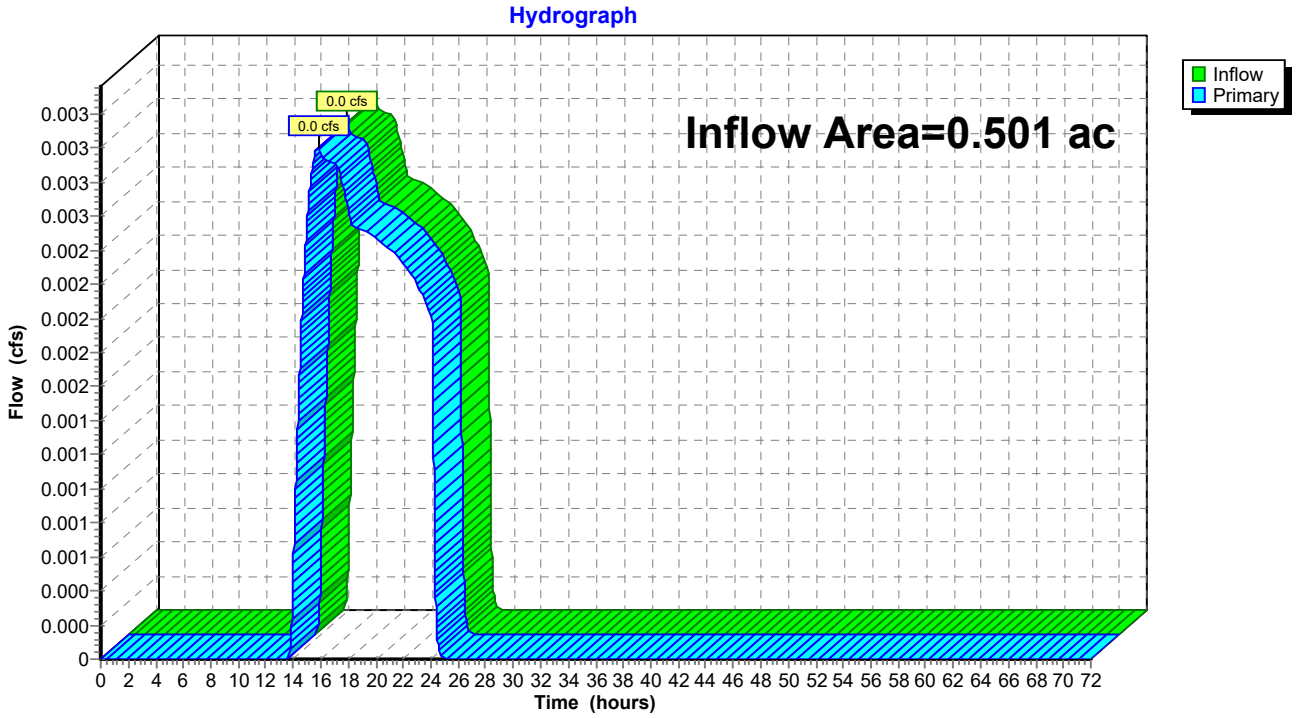
Summary for Pond AP-1E: AP-1E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.501 ac, 4.82% Impervious, Inflow Depth = 0.05" for 10-Year event
Inflow = 0.0 cfs @ 15.82 hrs, Volume= 0.002 af
Primary = 0.0 cfs @ 15.82 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-1E: AP-1E



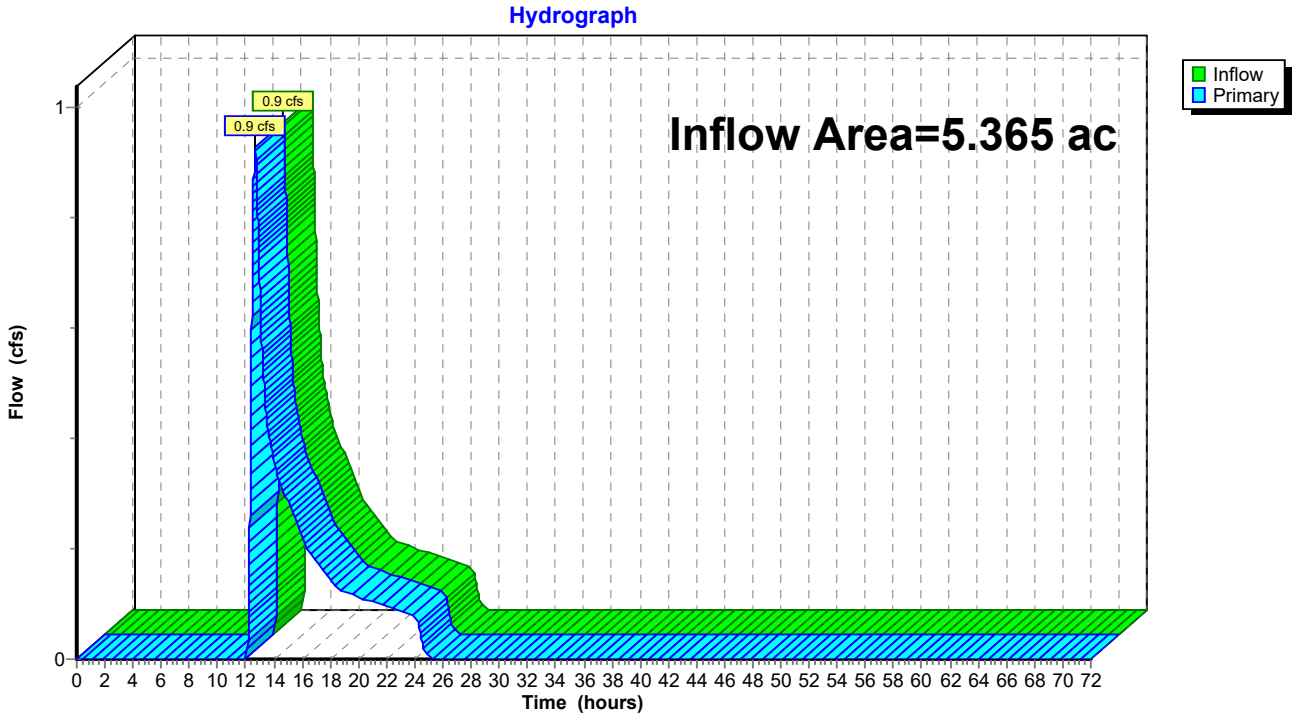
Summary for Pond AP-2E: AP-2E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.365 ac, 1.14% Impervious, Inflow Depth = 0.48" for 10-Year event
Inflow = 0.9 cfs @ 12.67 hrs, Volume= 0.215 af
Primary = 0.9 cfs @ 12.67 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-2E: AP-2E



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=21,842 sf 4.82% Impervious Runoff Depth=0.16"
Flow Length=248' Tc=16.5 min CN=35 Runoff=0.0 cfs 0.007 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=233,721 sf 1.14% Impervious Runoff Depth=0.78"
Flow Length=985' Tc=32.3 min CN=48 Runoff=1.9 cfs 0.351 af

Pond AP-1E: AP-1E Inflow=0.0 cfs 0.007 af
Primary=0.0 cfs 0.007 af

Pond AP-2E: AP-2E Inflow=1.9 cfs 0.351 af
Primary=1.9 cfs 0.351 af

Total Runoff Area = 5.867 ac Runoff Volume = 0.357 af Average Runoff Depth = 0.73"
98.54% Pervious = 5.782 ac 1.46% Impervious = 0.085 ac

Summary for Subcatchment EX-1: Subcat EX-1

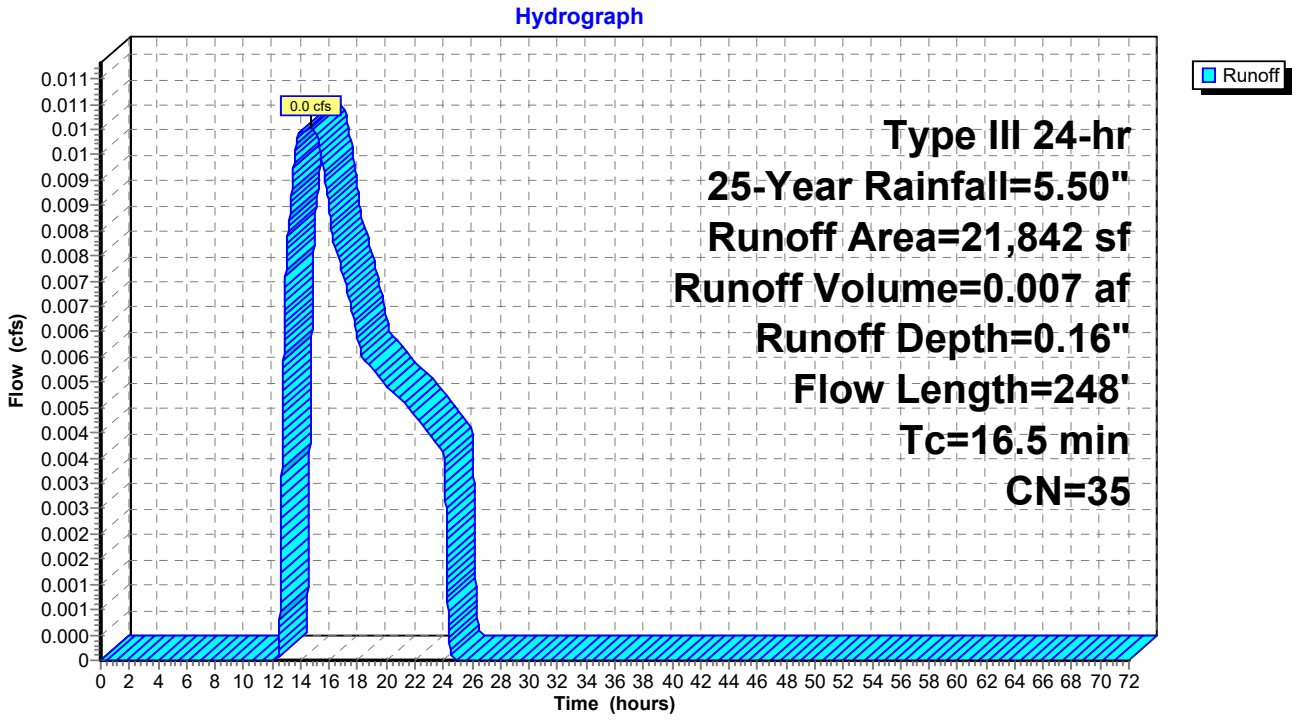
Runoff = 0.0 cfs @ 14.72 hrs, Volume= 0.007 af, Depth= 0.16"
Routed to Pond AP-1E : AP-1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
4,208	54	1/2 acre lots, 25% imp, HSG A
17,634	30	Woods, Good, HSG A
21,842	35	Weighted Average
20,790		95.18% Pervious Area
1,052		4.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow, A-->B** Woods: Light underbrush n= 0.400 P2= 3.22"
5.4	198	0.0152	0.62		**Shallow Concentrated Flow, B-->C** Woodland Kv= 5.0 fps
16.5	248	Total			

Subcatchment EX-1: Subcat EX-1



Summary for Subcatchment EX-2: Subcat EX-2

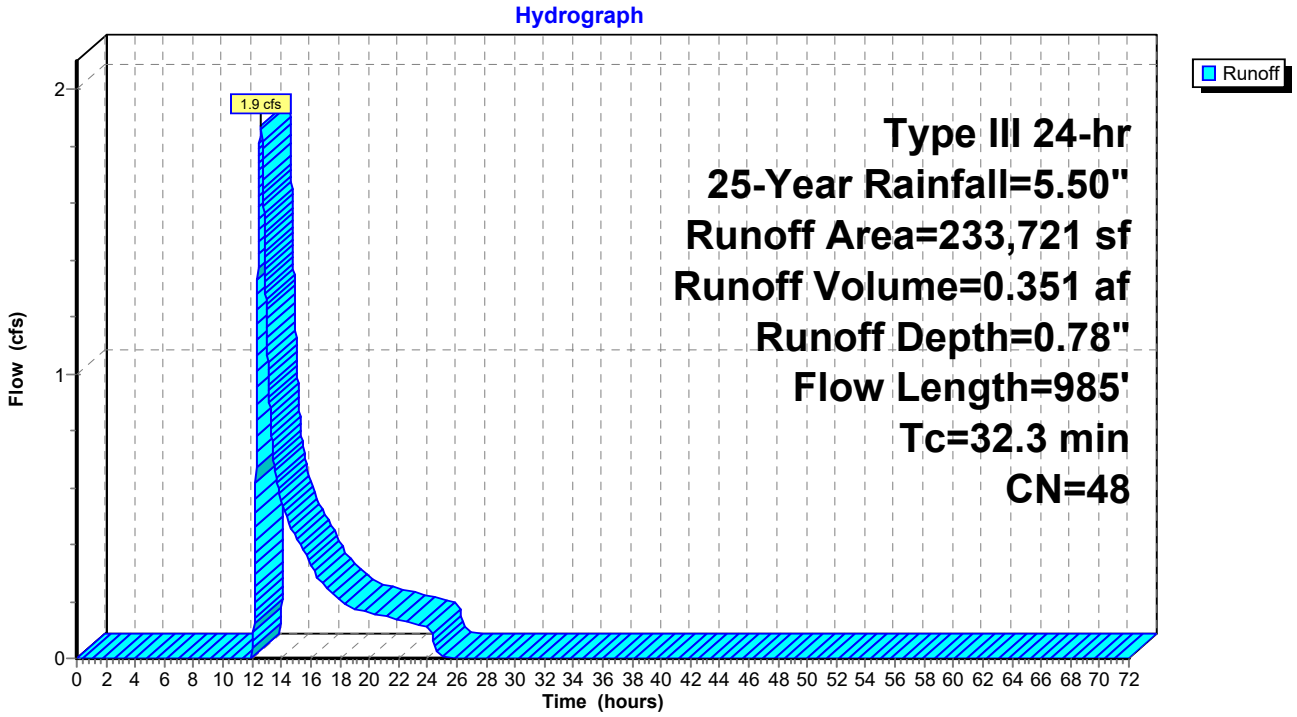
Runoff = 1.9 cfs @ 12.60 hrs, Volume= 0.351 af, Depth= 0.78"
Routed to Pond AP-2E : AP-2E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
10,667	54	1/2 acre lots, 25% imp, HSG A
61,545	30	Woods, Good, HSG A
161,509	55	Woods, Good, HSG B
233,721	48	Weighted Average
231,054		98.86% Pervious Area
2,667		1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0340	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.22"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.4	346	0.0321	0.90		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.8	490	0.0122	0.55		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
32.3	985	Total			

Subcatchment EX-2: Subcat EX-2



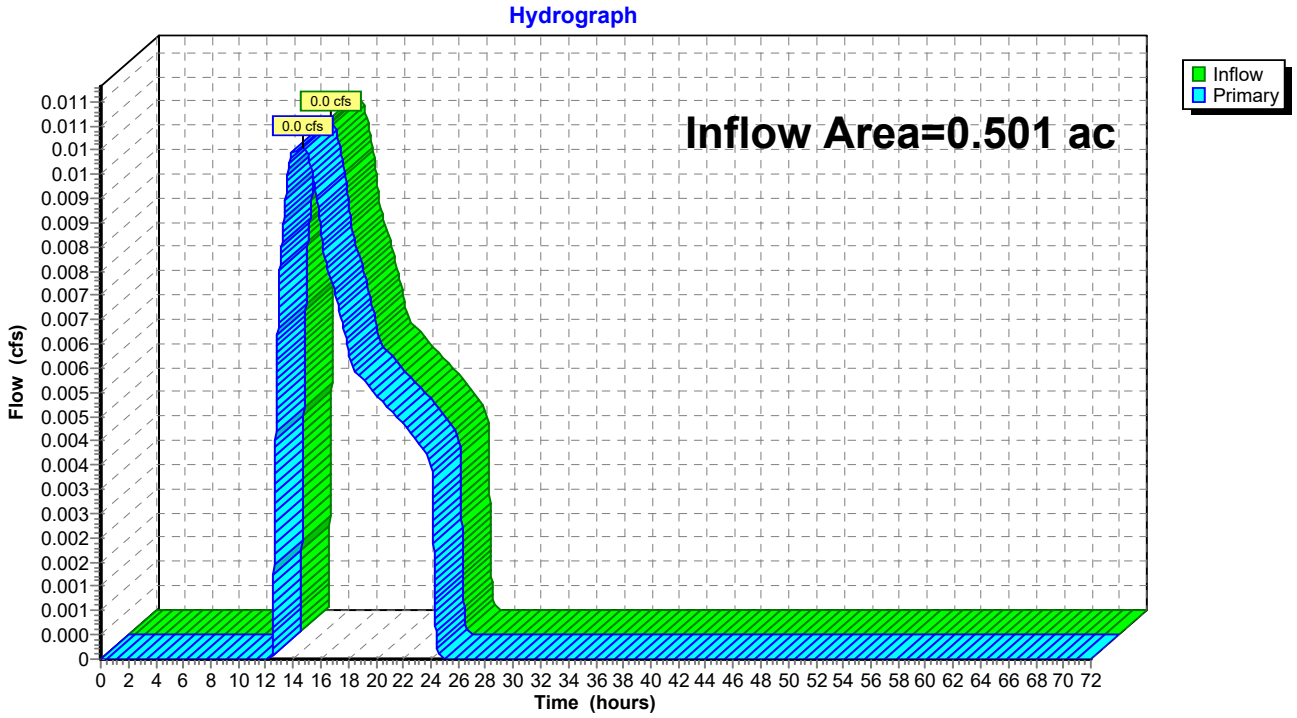
Summary for Pond AP-1E: AP-1E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.501 ac, 4.82% Impervious, Inflow Depth = 0.16" for 25-Year event
Inflow = 0.0 cfs @ 14.72 hrs, Volume= 0.007 af
Primary = 0.0 cfs @ 14.72 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-1E: AP-1E



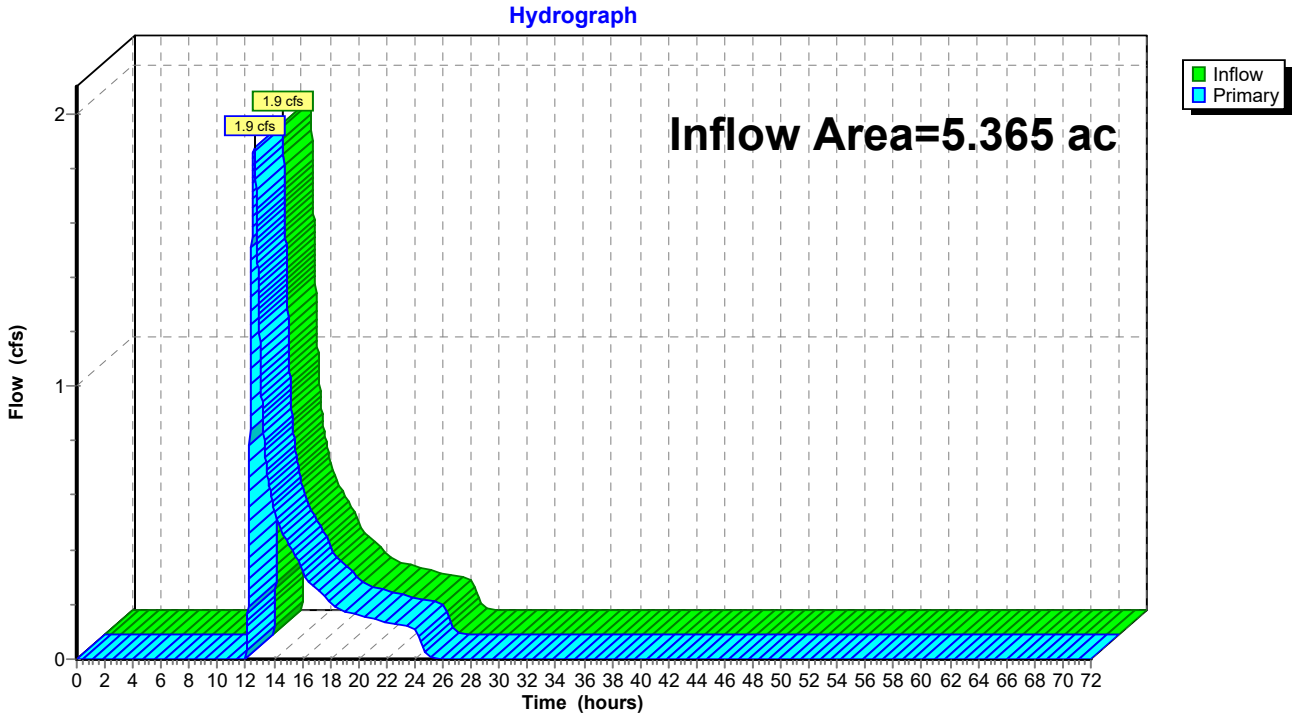
Summary for Pond AP-2E: AP-2E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.365 ac, 1.14% Impervious, Inflow Depth = 0.78" for 25-Year event
Inflow = 1.9 cfs @ 12.60 hrs, Volume= 0.351 af
Primary = 1.9 cfs @ 12.60 hrs, Volume= 0.351 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-2E: AP-2E



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=21,842 sf 4.82% Impervious Runoff Depth=0.49"
Flow Length=248' Tc=16.5 min CN=35 Runoff=0.1 cfs 0.021 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=233,721 sf 1.14% Impervious Runoff Depth=1.49"
Flow Length=985' Tc=32.3 min CN=48 Runoff=4.3 cfs 0.667 af

Pond AP-1E: AP-1E Inflow=0.1 cfs 0.021 af
Primary=0.1 cfs 0.021 af

Pond AP-2E: AP-2E Inflow=4.3 cfs 0.667 af
Primary=4.3 cfs 0.667 af

Total Runoff Area = 5.867 ac Runoff Volume = 0.687 af Average Runoff Depth = 1.41"
98.54% Pervious = 5.782 ac 1.46% Impervious = 0.085 ac

Summary for Subcatchment EX-1: Subcat EX-1

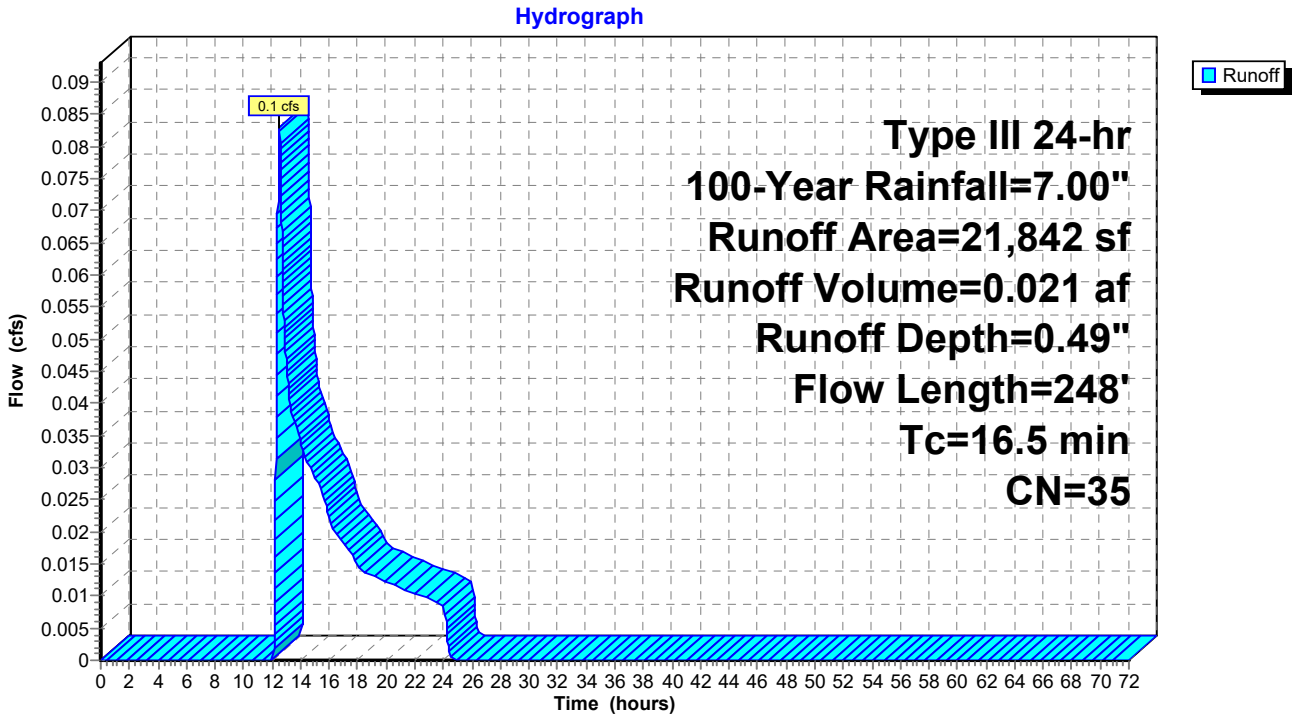
Runoff = 0.1 cfs @ 12.52 hrs, Volume= 0.021 af, Depth= 0.49"
Routed to Pond AP-1E : AP-1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
4,208	54	1/2 acre lots, 25% imp, HSG A
17,634	30	Woods, Good, HSG A
21,842	35	Weighted Average
20,790		95.18% Pervious Area
1,052		4.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow, A-->B** Woods: Light underbrush n= 0.400 P2= 3.22"
5.4	198	0.0152	0.62		**Shallow Concentrated Flow, B-->C** Woodland Kv= 5.0 fps
16.5	248	Total			

Subcatchment EX-1: Subcat EX-1



Summary for Subcatchment EX-2: Subcat EX-2

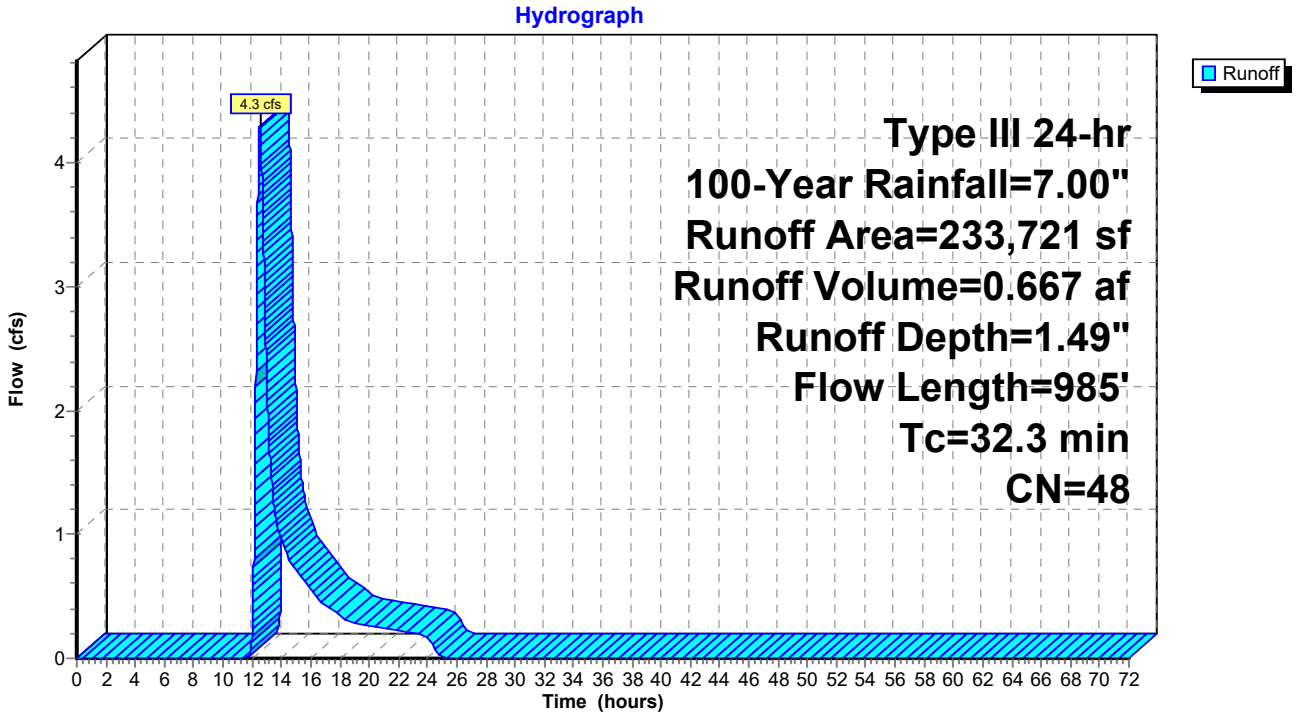
Runoff = 4.3 cfs @ 12.53 hrs, Volume= 0.667 af, Depth= 1.49"
Routed to Pond AP-2E : AP-2E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
10,667	54	1/2 acre lots, 25% imp, HSG A
61,545	30	Woods, Good, HSG A
161,509	55	Woods, Good, HSG B
233,721	48	Weighted Average
231,054		98.86% Pervious Area
2,667		1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0340	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.22"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.4	346	0.0321	0.90		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.8	490	0.0122	0.55		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
32.3	985	Total			

Subcatchment EX-2: Subcat EX-2



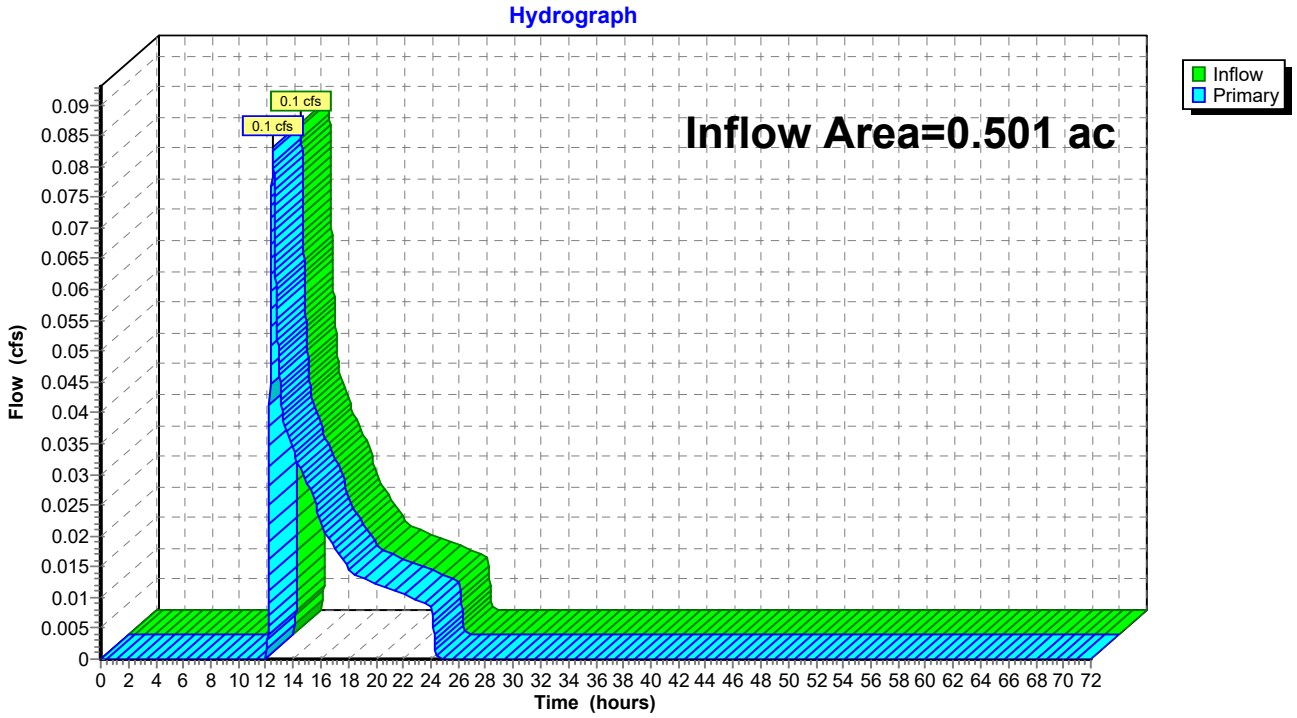
Summary for Pond AP-1E: AP-1E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.501 ac, 4.82% Impervious, Inflow Depth = 0.49" for 100-Year event
Inflow = 0.1 cfs @ 12.52 hrs, Volume= 0.021 af
Primary = 0.1 cfs @ 12.52 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-1E: AP-1E



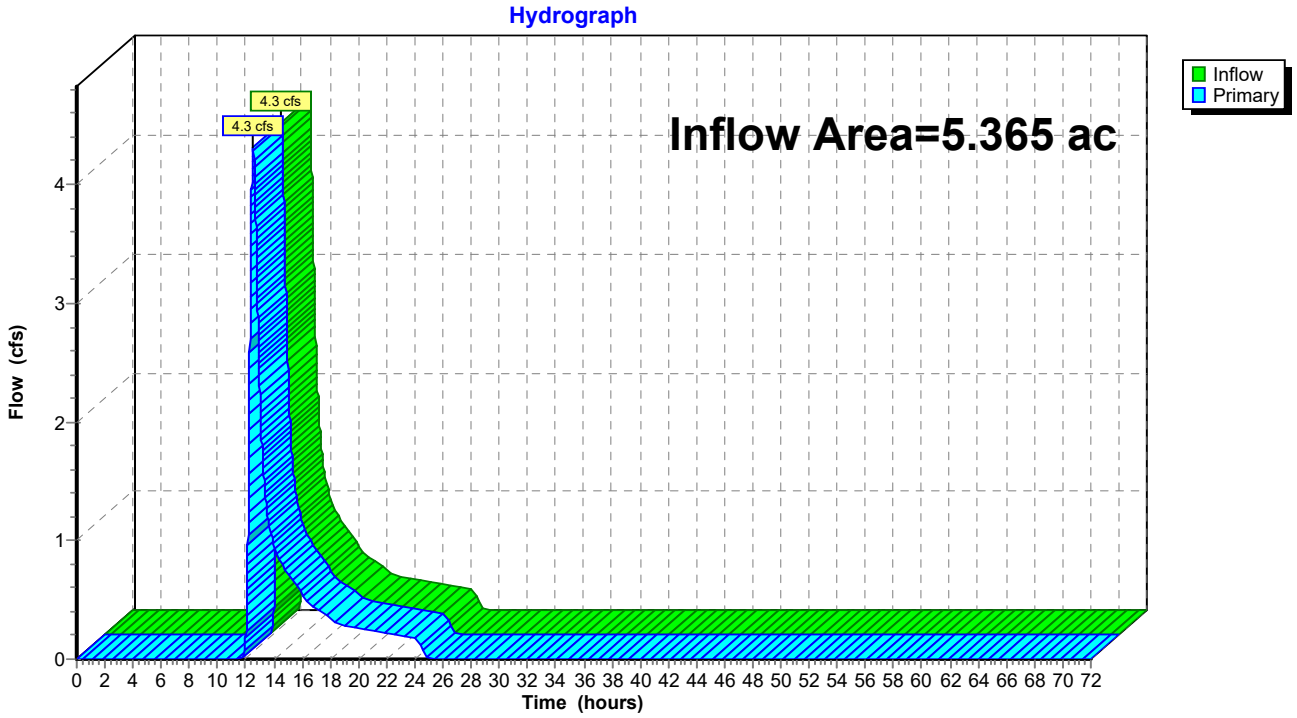
Summary for Pond AP-2E: AP-2E

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.365 ac, 1.14% Impervious, Inflow Depth = 1.49" for 100-Year event
Inflow = 4.3 cfs @ 12.53 hrs, Volume= 0.667 af
Primary = 4.3 cfs @ 12.53 hrs, Volume= 0.667 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Pond AP-2E: AP-2E



Events for Subcatchment EX-1: Subcat EX-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.20	0.0	0.000	0.00
10-Year	4.70	0.0	0.002	0.05
25-Year	5.50	0.0	0.007	0.16
100-Year	**7.00**	**0.1**	**0.021**	**0.49**

Events for Subcatchment EX-2: Subcat EX-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.20	0.1	0.040	0.09
10-Year	4.70	0.9	0.215	0.48
25-Year	5.50	1.9	0.351	0.78
100-Year	**7.00**	**4.3**	**0.667**	**1.49**

Events for Pond AP-1E: AP-1E

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.0	0.0	**0.00**	**0.000**
10-Year	0.0	0.0	0.00	0.000
25-Year	0.0	0.0	0.00	0.000
100-Year	**0.1**	**0.1**	0.00	0.000

Events for Pond AP-2E: AP-2E

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.1	0.1	**0.00**	**0.000**
10-Year	0.9	0.9	0.00	0.000
25-Year	1.9	1.9	0.00	0.000
100-Year	**4.3**	**4.3**	0.00	0.000

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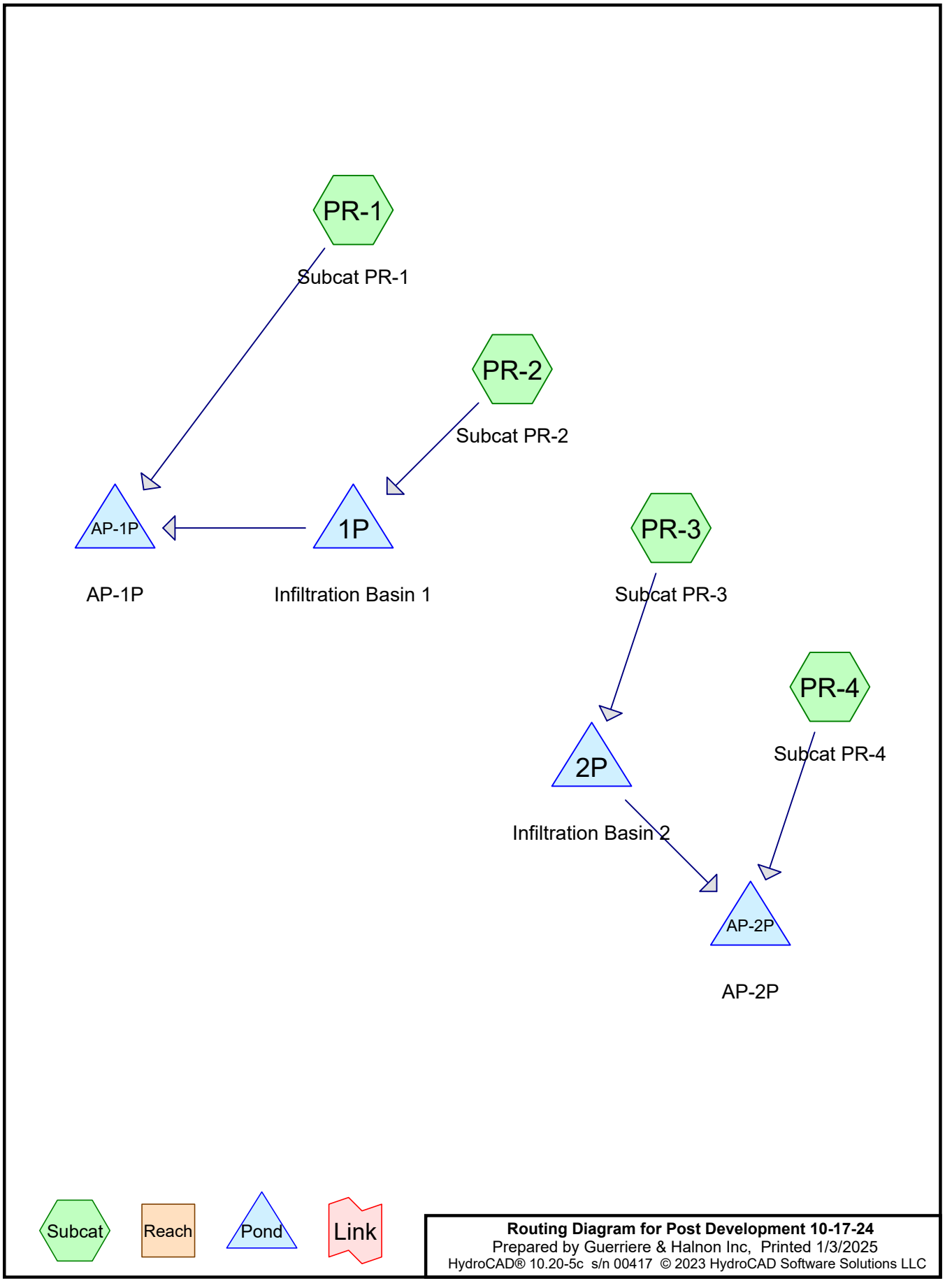
Multi-Event Tables



Routing Diagram for Post Development 10-17-24
Prepared by Guerriere & Halnon Inc, Printed 1/3/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC	P2 (inches)
1	2-Year	NOAA10 24-hr	D	Default	24.00	1	3.39	2	3.36
2	10-Year	NOAA10 24-hr	D	Default	24.00	1	5.25	2	5.24
3	25-Year	NOAA10 24-hr	D	Default	24.00	1	6.41	2	6.42
4	100-Year	NOAA10 24-hr	D	Default	24.00	1	8.19	2	8.23

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.340	54	1/2 acre lots, 25% imp, HSG A (PR-1, PR-2, PR-3, PR-4)
1.134	39	>75% Grass cover, Good, HSG A (PR-1, PR-2, PR-3, PR-4)
0.560	61	>75% Grass cover, Good, HSG B (PR-2, PR-3, PR-4)
0.129	98	Paved parking, HSG A (PR-2, PR-3)
0.090	98	Roofs, HSG A (PR-2, PR-3)
0.028	98	Roofs, HSG B (PR-3)
0.466	30	Woods, Good, HSG A (PR-1, PR-2, PR-3, PR-4)
3.097	55	Woods, Good, HSG B (PR-2, PR-3, PR-4)
5.845	**52**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.160	HSG A	PR-1, PR-2, PR-3, PR-4
3.685	HSG B	PR-2, PR-3, PR-4
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.845		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.340	0.000	0.000	0.000	0.000	0.340	1/2 acre lots, 25% imp	PR-1, PR-2, PR-3, PR-4
1.134	0.560	0.000	0.000	0.000	1.695	>75% Grass cover, Good	PR-1, PR-2, PR-3, PR-4
0.129	0.000	0.000	0.000	0.000	0.129	Paved parking	PR-2, PR-3
0.090	0.028	0.000	0.000	0.000	0.119	Roofs	PR-2, PR-3
0.466	3.097	0.000	0.000	0.000	3.563	Woods, Good	PR-1, PR-2, PR-3, PR-4
2.160	**3.685**	**0.000**	**0.000**	**0.000**	**5.845**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=8,206 sf 7.69% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=2.877 ac 4.96% Impervious Runoff Depth=0.22"
Flow Length=659' Tc=19.9 min CN=52 Runoff=0.09 cfs 0.053 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=2.611 ac 6.60% Impervious Runoff Depth=0.28"
Tc=6.0 min CN=54 Runoff=0.28 cfs 0.061 af

Subcatchment PR-4: Subcat PR-4 Runoff Area=7,385 sf 2.14% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0.000 af

Pond 1P: Infiltration Basin 1 Peak Elev=294.00' Storage=17 cf Inflow=0.09 cfs 0.053 af
Discarded=0.09 cfs 0.053 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.053 af

Pond 2P: Infiltration Basin 2 Peak Elev=293.01' Storage=40 cf Inflow=0.28 cfs 0.061 af
Discarded=0.22 cfs 0.061 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.061 af

Pond AP-1P: AP-1P Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond AP-2P: AP-2P Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 5.845 ac Runoff Volume = 0.114 af Average Runoff Depth = 0.23"
94.30% Pervious = 5.512 ac 5.70% Impervious = 0.333 ac

Summary for Subcatchment PR-1: Subcat PR-1

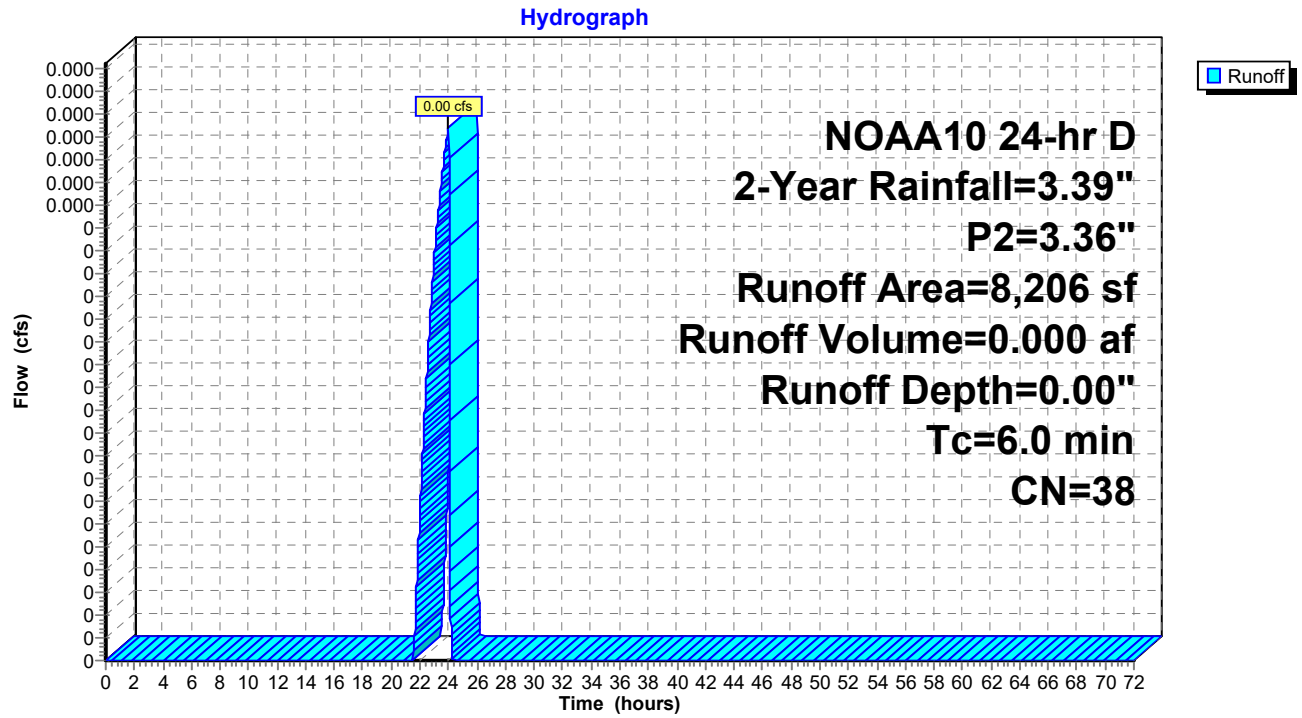
Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond AP-1P : AP-1P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.39", P2=3.36"

Area (sf)	CN	Description
2,525	54	1/2 acre lots, 25% imp, HSG A
579	39	>75% Grass cover, Good, HSG A
5,102	30	Woods, Good, HSG A
8,206	38	Weighted Average
7,575		92.31% Pervious Area
631		7.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-1: Subcat PR-1



Summary for Subcatchment PR-2: Subcat PR-2

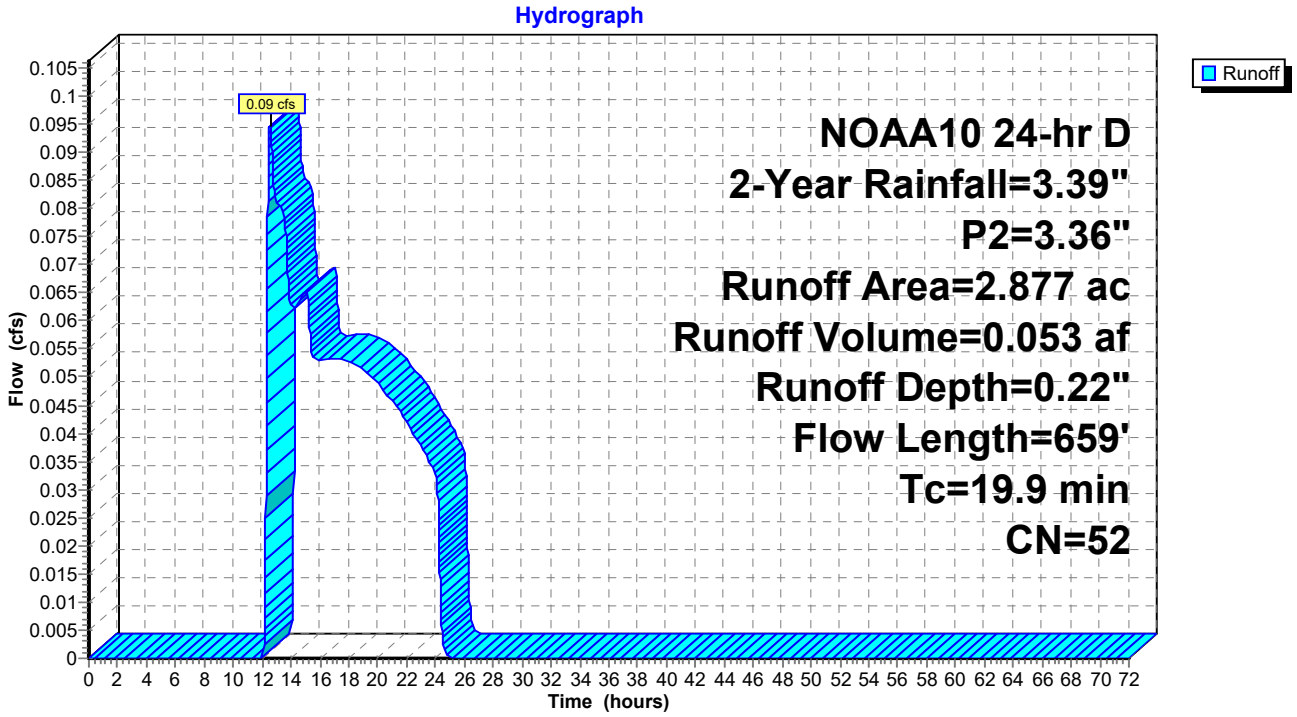
Runoff = 0.09 cfs @ 12.54 hrs, Volume= 0.053 af, Depth= 0.22"
Routed to Pond 1P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.39", P2=3.36"

Area (ac)	CN	Description
0.076	54	1/2 acre lots, 25% imp, HSG A
0.584	39	>75% Grass cover, Good, HSG A
0.183	61	>75% Grass cover, Good, HSG B
0.064	98	Paved parking, HSG A
0.059	98	Roofs, HSG A
0.177	30	Woods, Good, HSG A
1.733	55	Woods, Good, HSG B
2.877	52	Weighted Average
2.734		95.04% Pervious Area
0.143		4.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.36"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	403	0.0320	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	107	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.9	659	Total			

Subcatchment PR-2: Subcat PR-2



Summary for Subcatchment PR-3: Subcat PR-3

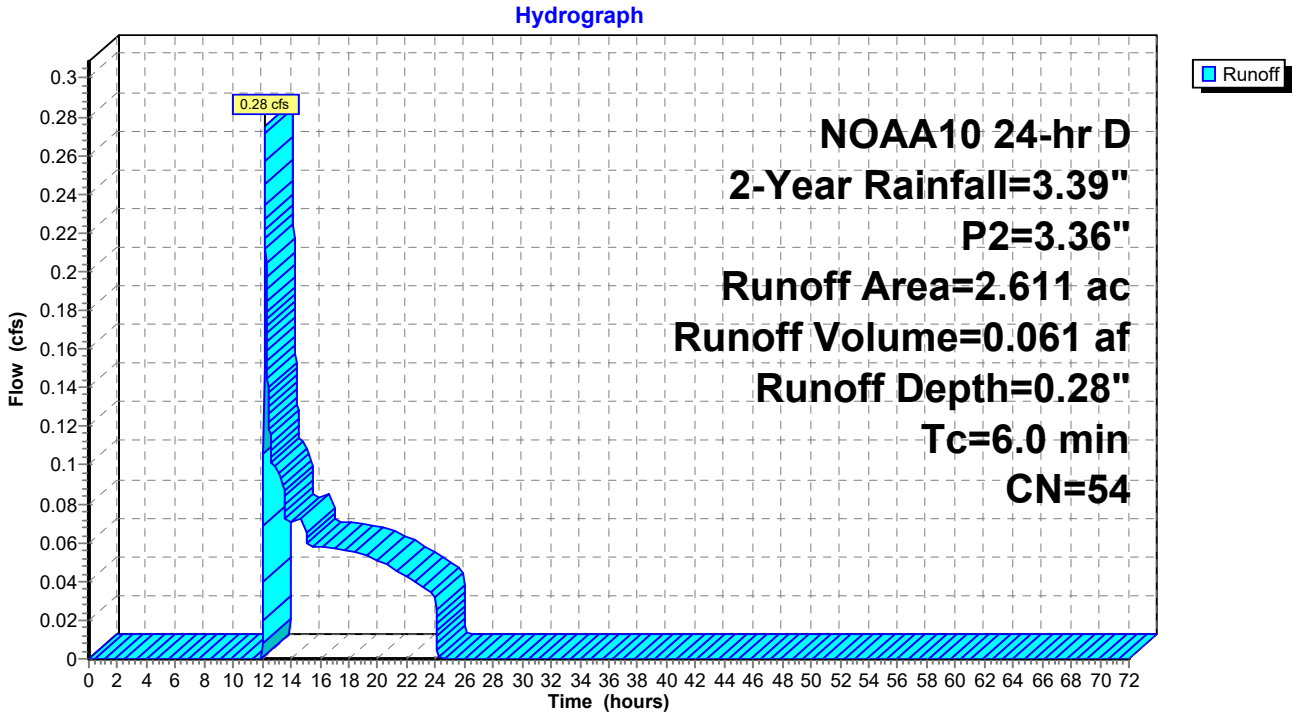
Runoff = 0.28 cfs @ 12.17 hrs, Volume= 0.061 af, Depth= 0.28"
Routed to Pond 2P : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.39", P2=3.36"

Area (ac)	CN	Description
0.192	54	1/2 acre lots, 25% imp, HSG A
0.499	39	>75% Grass cover, Good, HSG A
0.376	61	>75% Grass cover, Good, HSG B
0.065	98	Paved parking, HSG A
0.031	98	Roofs, HSG A
0.028	98	Roofs, HSG B
0.095	30	Woods, Good, HSG A
1.325	55	Woods, Good, HSG B
2.611	54	Weighted Average
2.438		93.40% Pervious Area
0.172		6.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-3: Subcat PR-3



Summary for Subcatchment PR-4: Subcat PR-4

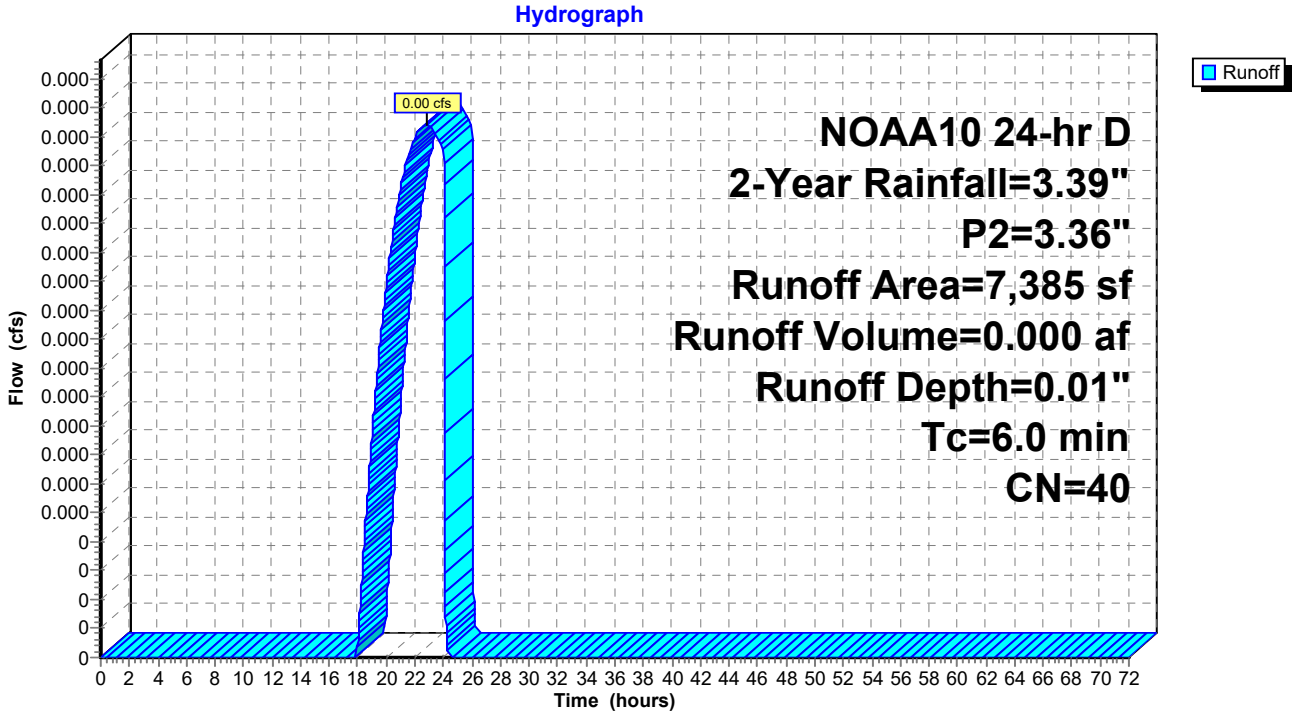
Runoff = 0.00 cfs @ 22.85 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond AP-2P : AP-2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.39", P2=3.36"

Area (sf)	CN	Description
633	54	1/2 acre lots, 25% imp, HSG A
1,640	39	>75% Grass cover, Good, HSG A
70	61	>75% Grass cover, Good, HSG B
3,335	30	Woods, Good, HSG A
1,707	55	Woods, Good, HSG B
7,385	40	Weighted Average
7,227		97.86% Pervious Area
158		2.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-4: Subcat PR-4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 2.877 ac, 4.96% Impervious, Inflow Depth = 0.22" for 2-Year event
Inflow = 0.09 cfs @ 12.54 hrs, Volume= 0.053 af
Outflow = 0.09 cfs @ 12.60 hrs, Volume= 0.053 af, Atten= 2%, Lag= 3.9 min
Discarded = 0.09 cfs @ 12.60 hrs, Volume= 0.053 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-1P : AP-1P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 294.00' @ 12.60 hrs Surf.Area= 4,677 sf Storage= 17 cf

Plug-Flow detention time= 3.0 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (1,051.8 - 1,048.8)

Volume	Invert	Avail.Storage	Storage Description
#1	294.00'	12,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

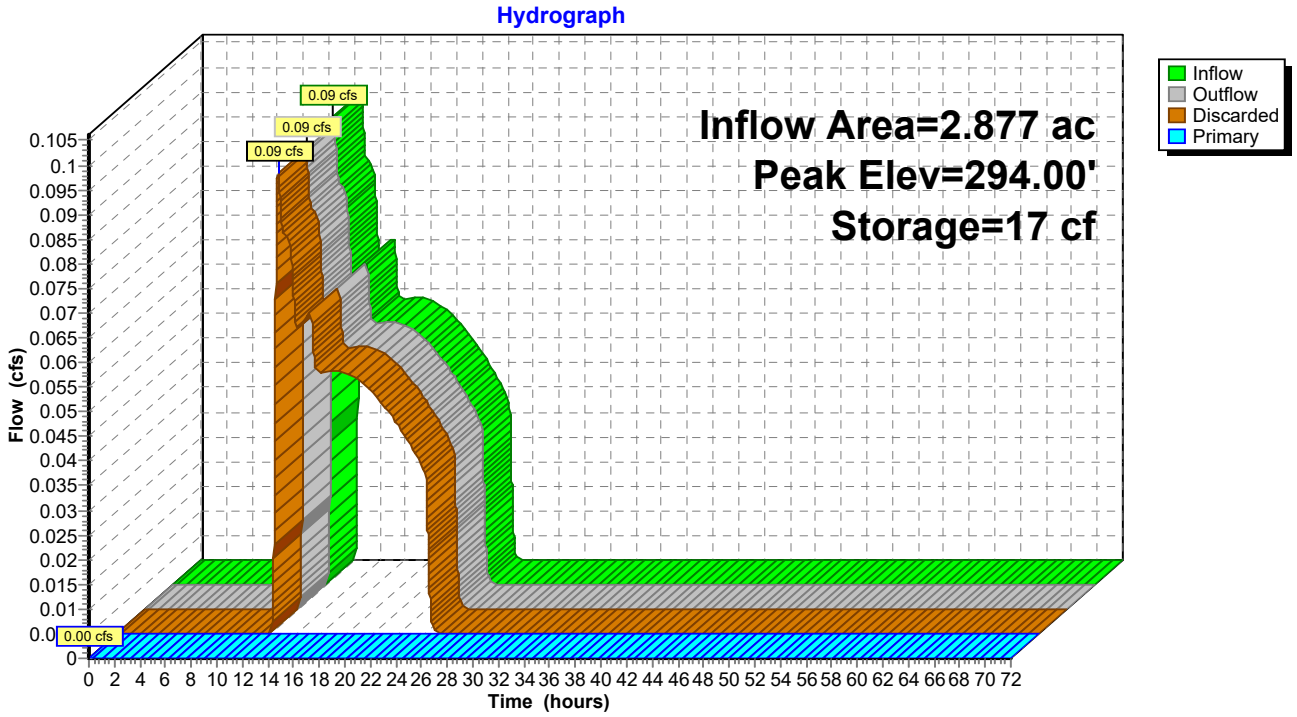
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	4,671	0	0
296.00	8,198	12,869	12,869

Device	Routing	Invert	Outlet Devices
#1	Primary	295.50'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	294.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.09 cfs @ 12.60 hrs HW=294.00' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=294.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 2.611 ac, 6.60% Impervious, Inflow Depth = 0.28" for 2-Year event
Inflow = 0.28 cfs @ 12.17 hrs, Volume= 0.061 af
Outflow = 0.22 cfs @ 12.23 hrs, Volume= 0.061 af, Atten= 20%, Lag= 3.9 min
Discarded = 0.22 cfs @ 12.23 hrs, Volume= 0.061 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-2P : AP-2P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 293.01' @ 12.23 hrs Surf.Area= 5,429 sf Storage= 40 cf

Plug-Flow detention time= 3.0 min calculated for 0.061 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (1,017.5 - 1,014.5)

Volume	Invert	Avail.Storage	Storage Description
#1	293.00'	15,612 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

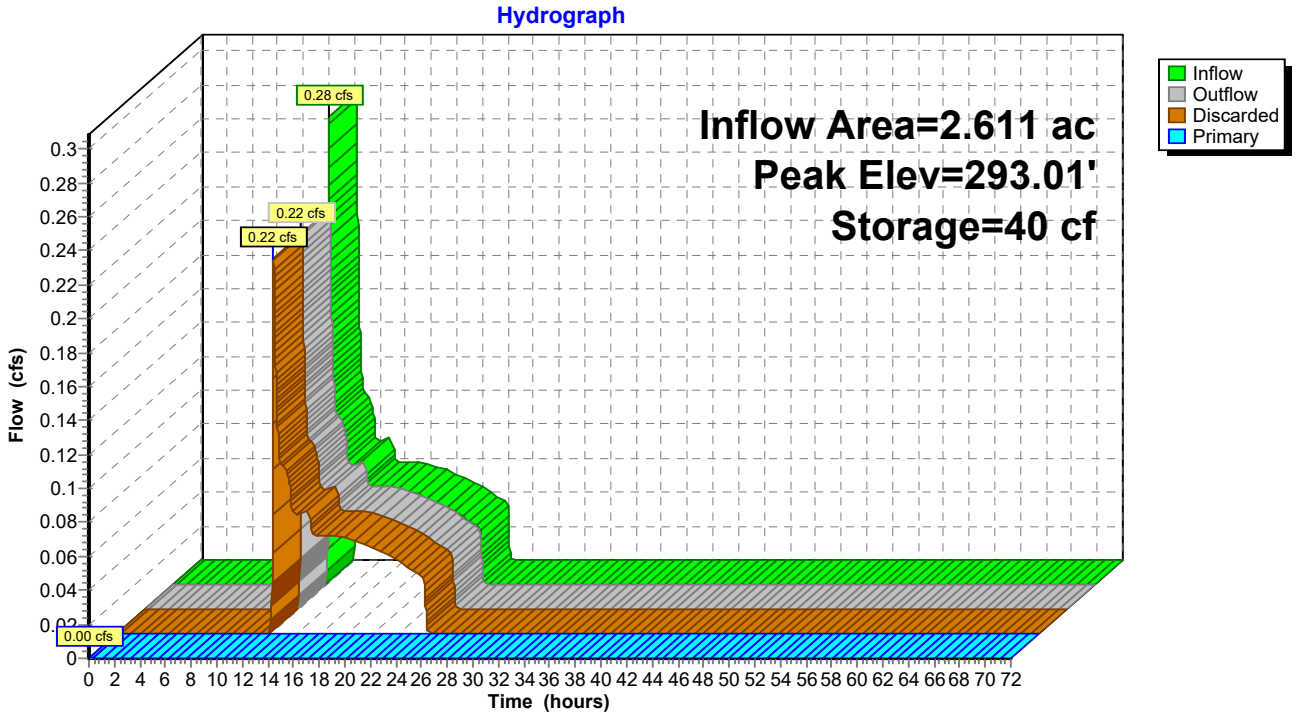
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.00	5,409	0	0
294.00	8,198	6,804	6,804
295.00	9,418	8,808	15,612

Device	Routing	Invert	Outlet Devices
#1	Discarded	293.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	293.83'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.22 cfs @ 12.23 hrs HW=293.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=293.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



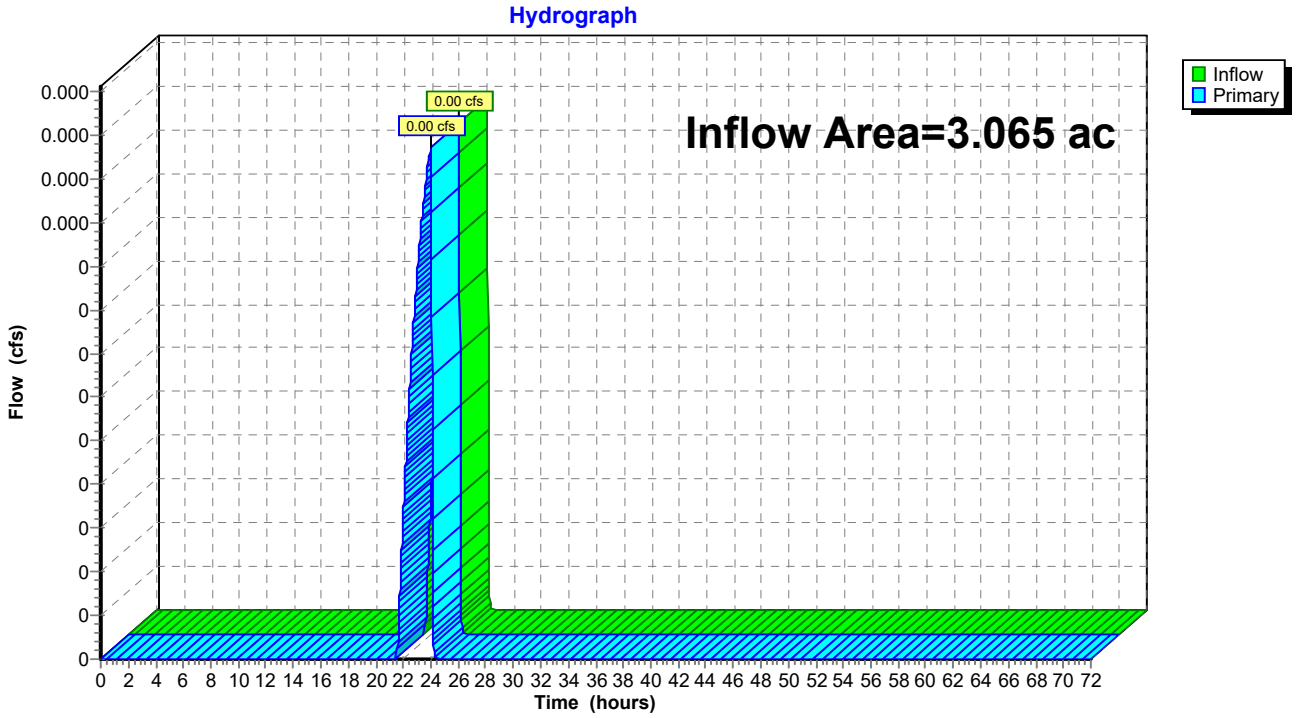
Summary for Pond AP-1P: AP-1P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.065 ac, 5.13% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-1P: AP-1P



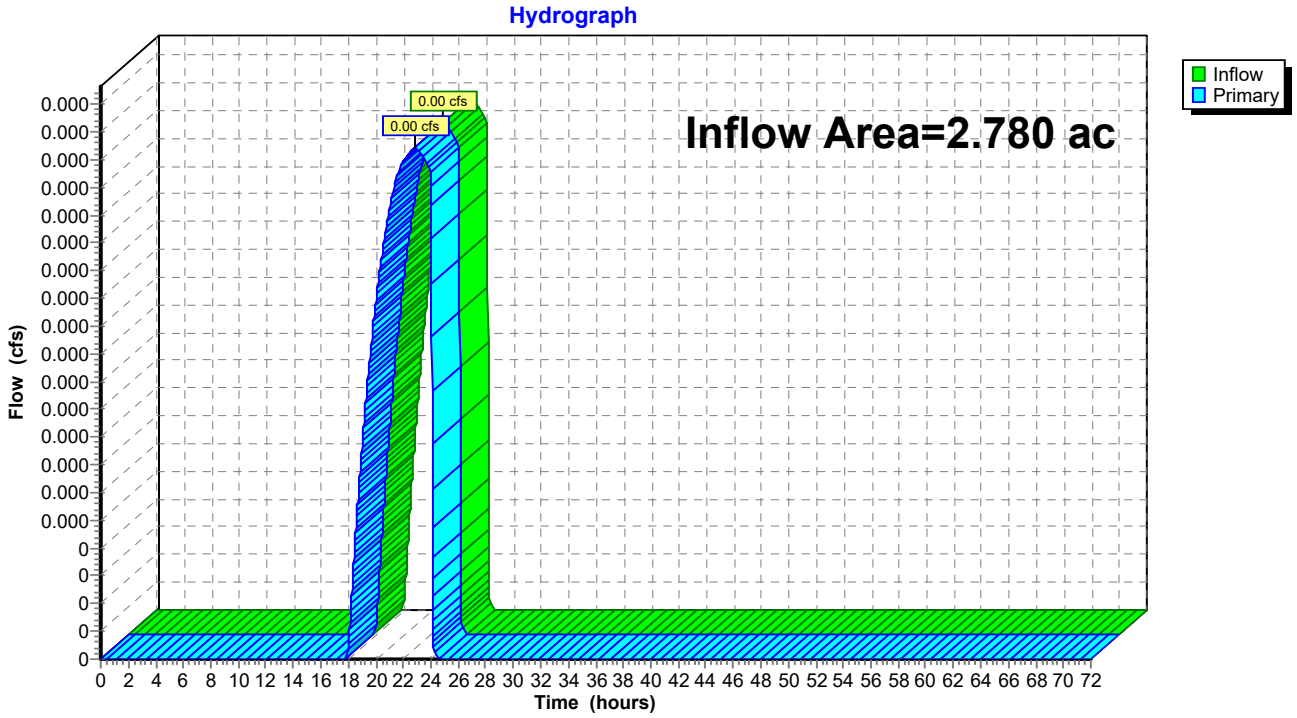
Summary for Pond AP-2P: AP-2P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.780 ac, 6.33% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 22.85 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 22.85 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-2P: AP-2P



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=8,206 sf 7.69% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=38 Runoff=0.00 cfs 0.003 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=2.877 ac 4.96% Impervious Runoff Depth=0.92"
Flow Length=659' Tc=17.8 min CN=52 Runoff=1.58 cfs 0.220 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=2.611 ac 6.60% Impervious Runoff Depth=1.04"
Tc=6.0 min CN=54 Runoff=2.93 cfs 0.227 af

Subcatchment PR-4: Subcat PR-4 Runoff Area=7,385 sf 2.14% Impervious Runoff Depth=0.29"
Tc=6.0 min CN=40 Runoff=0.01 cfs 0.004 af

Pond 1P: Infiltration Basin 1 Peak Elev=294.39' Storage=1,976 cf Inflow=1.58 cfs 0.220 af
Discarded=0.30 cfs 0.220 af Primary=0.00 cfs 0.000 af Outflow=0.30 cfs 0.220 af

Pond 2P: Infiltration Basin 2 Peak Elev=293.35' Storage=2,035 cf Inflow=2.93 cfs 0.227 af
Discarded=0.36 cfs 0.227 af Primary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.227 af

Pond AP-1P: AP-1P Inflow=0.00 cfs 0.003 af
Primary=0.00 cfs 0.003 af

Pond AP-2P: AP-2P Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Total Runoff Area = 5.845 ac Runoff Volume = 0.454 af Average Runoff Depth = 0.93"
94.30% Pervious = 5.512 ac 5.70% Impervious = 0.333 ac

Summary for Subcatchment PR-1: Subcat PR-1

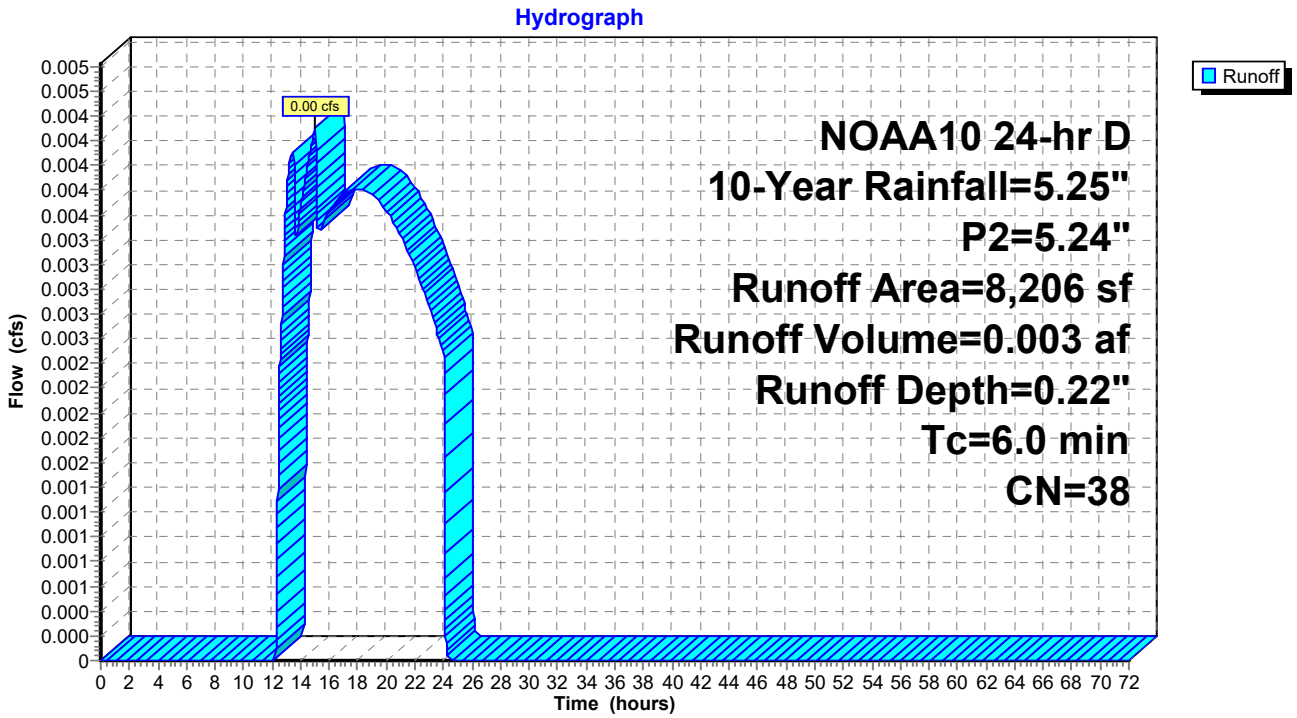
Runoff = 0.00 cfs @ 15.02 hrs, Volume= 0.003 af, Depth= 0.22"
Routed to Pond AP-1P : AP-1P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.25", P2=5.24"

Area (sf)	CN	Description
2,525	54	1/2 acre lots, 25% imp, HSG A
579	39	>75% Grass cover, Good, HSG A
5,102	30	Woods, Good, HSG A
8,206	38	Weighted Average
7,575		92.31% Pervious Area
631		7.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-1: Subcat PR-1



Summary for Subcatchment PR-2: Subcat PR-2

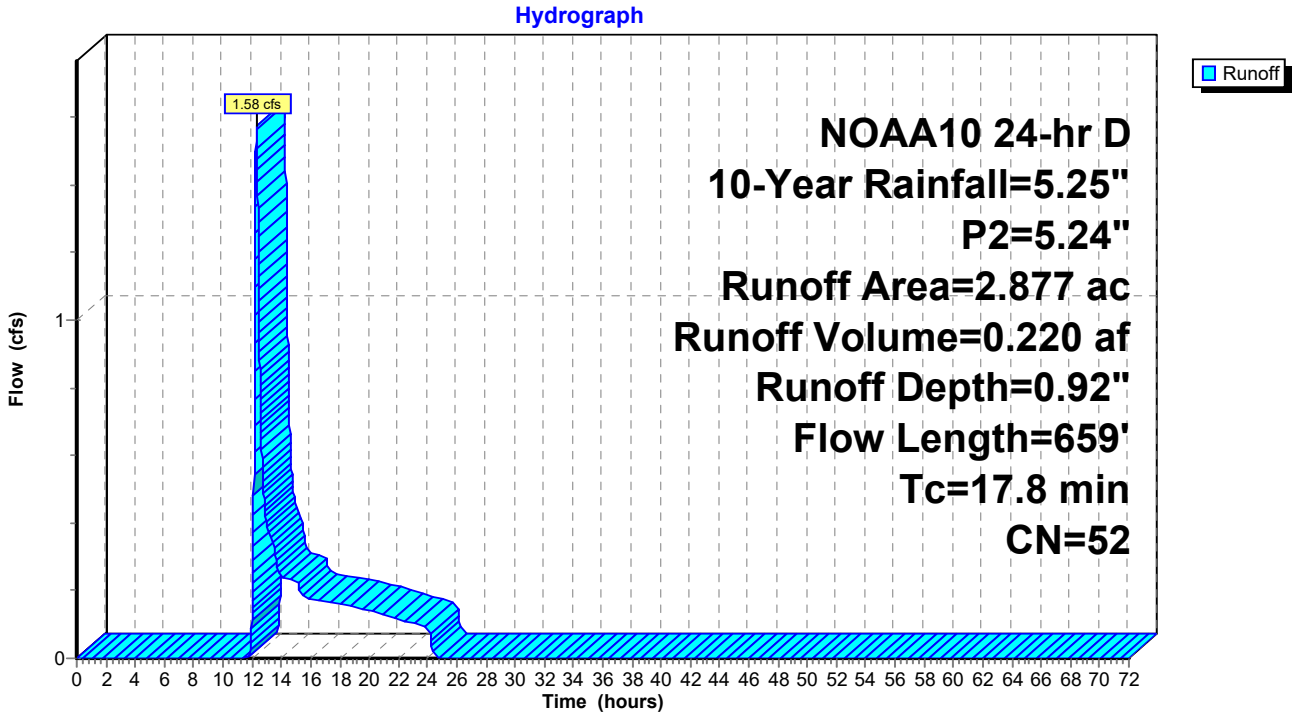
Runoff = 1.58 cfs @ 12.29 hrs, Volume= 0.220 af, Depth= 0.92"
Routed to Pond 1P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.25", P2=5.24"

Area (ac)	CN	Description
0.076	54	1/2 acre lots, 25% imp, HSG A
0.584	39	>75% Grass cover, Good, HSG A
0.183	61	>75% Grass cover, Good, HSG B
0.064	98	Paved parking, HSG A
0.059	98	Roofs, HSG A
0.177	30	Woods, Good, HSG A
1.733	55	Woods, Good, HSG B
2.877	52	Weighted Average
2.734		95.04% Pervious Area
0.143		4.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0280	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 5.24"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	403	0.0320	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	107	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
17.8	659	Total			

Subcatchment PR-2: Subcat PR-2



Summary for Subcatchment PR-3: Subcat PR-3

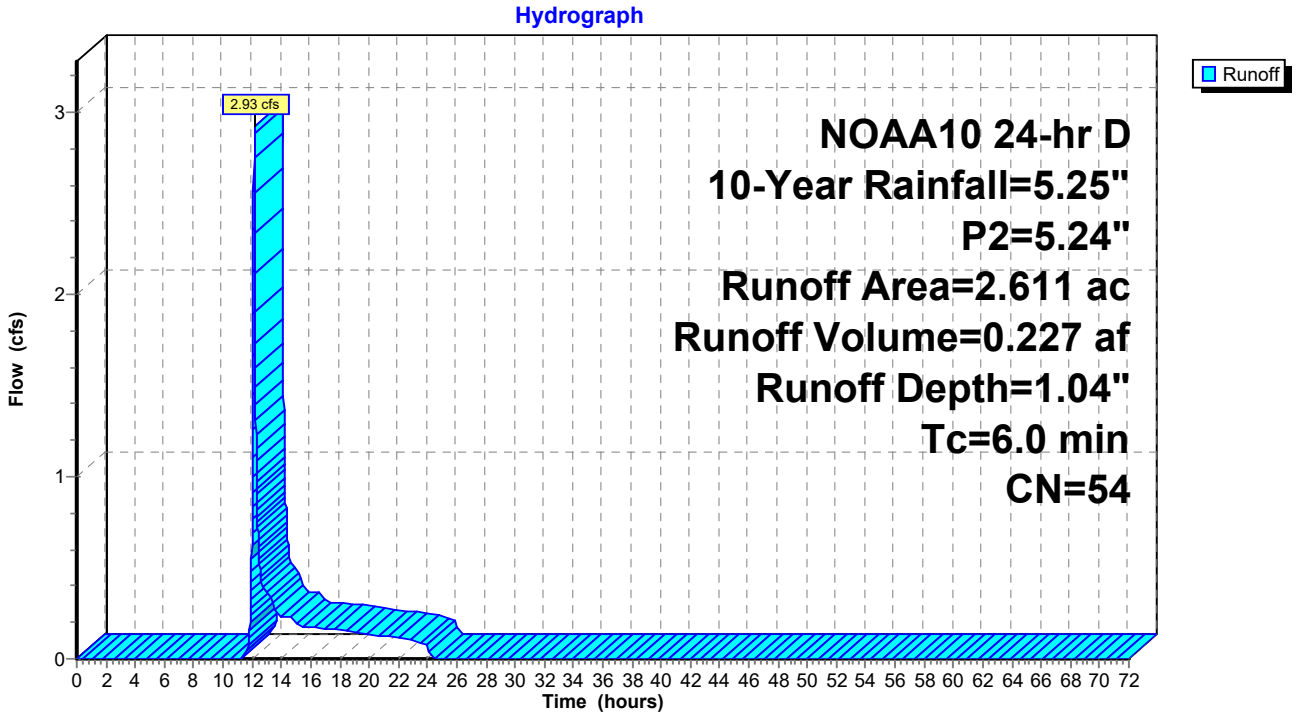
Runoff = 2.93 cfs @ 12.14 hrs, Volume= 0.227 af, Depth= 1.04"
Routed to Pond 2P : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.25", P2=5.24"

Area (ac)	CN	Description
0.192	54	1/2 acre lots, 25% imp, HSG A
0.499	39	>75% Grass cover, Good, HSG A
0.376	61	>75% Grass cover, Good, HSG B
0.065	98	Paved parking, HSG A
0.031	98	Roofs, HSG A
0.028	98	Roofs, HSG B
0.095	30	Woods, Good, HSG A
1.325	55	Woods, Good, HSG B
2.611	54	Weighted Average
2.438		93.40% Pervious Area
0.172		6.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-3: Subcat PR-3



Summary for Subcatchment PR-4: Subcat PR-4

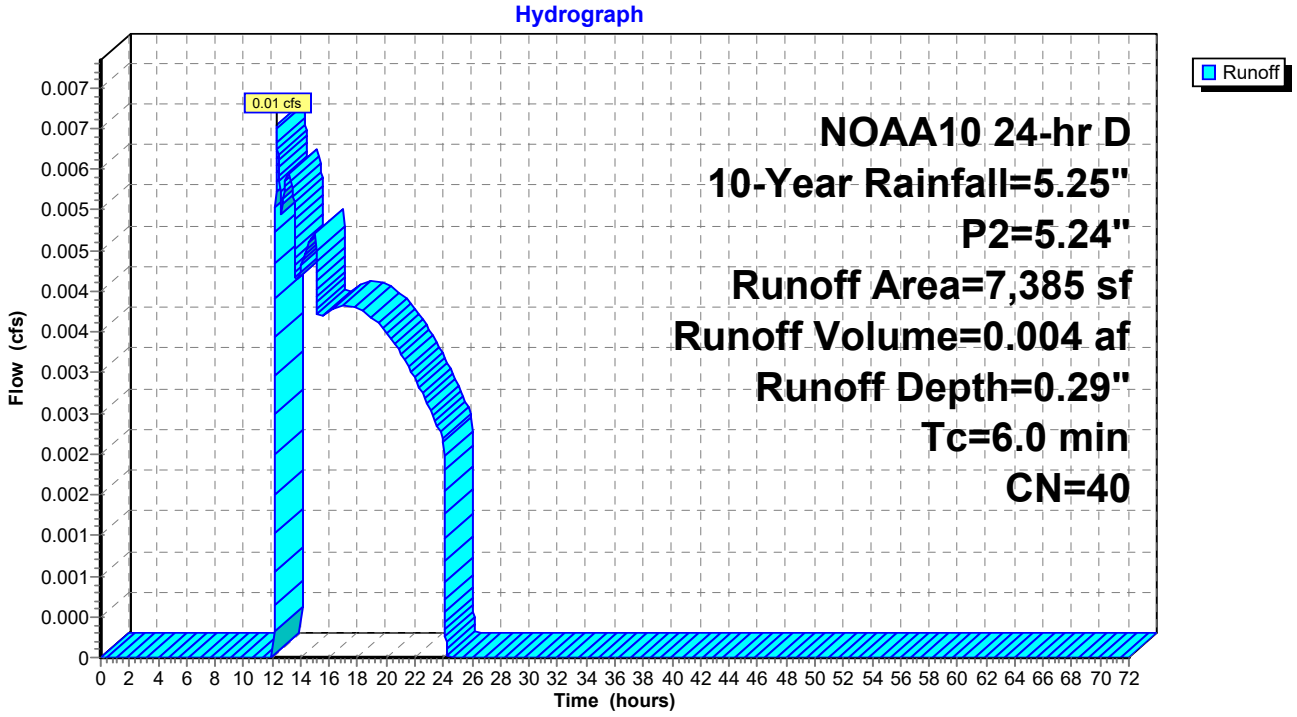
Runoff = 0.01 cfs @ 12.35 hrs, Volume= 0.004 af, Depth= 0.29"
Routed to Pond AP-2P : AP-2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.25", P2=5.24"

Area (sf)	CN	Description
633	54	1/2 acre lots, 25% imp, HSG A
1,640	39	>75% Grass cover, Good, HSG A
70	61	>75% Grass cover, Good, HSG B
3,335	30	Woods, Good, HSG A
1,707	55	Woods, Good, HSG B
7,385	40	Weighted Average
7,227		97.86% Pervious Area
158		2.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-4: Subcat PR-4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 2.877 ac, 4.96% Impervious, Inflow Depth = 0.92" for 10-Year event
Inflow = 1.58 cfs @ 12.29 hrs, Volume= 0.220 af
Outflow = 0.30 cfs @ 13.65 hrs, Volume= 0.220 af, Atten= 81%, Lag= 81.4 min
Discarded = 0.30 cfs @ 13.65 hrs, Volume= 0.220 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-1P : AP-1P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 294.39' @ 13.65 hrs Surf.Area= 5,365 sf Storage= 1,976 cf

Plug-Flow detention time= 54.6 min calculated for 0.220 af (100% of inflow)
Center-of-Mass det. time= 54.6 min (1,016.3 - 961.7)

Volume	Invert	Avail.Storage	Storage Description
#1	294.00'	12,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

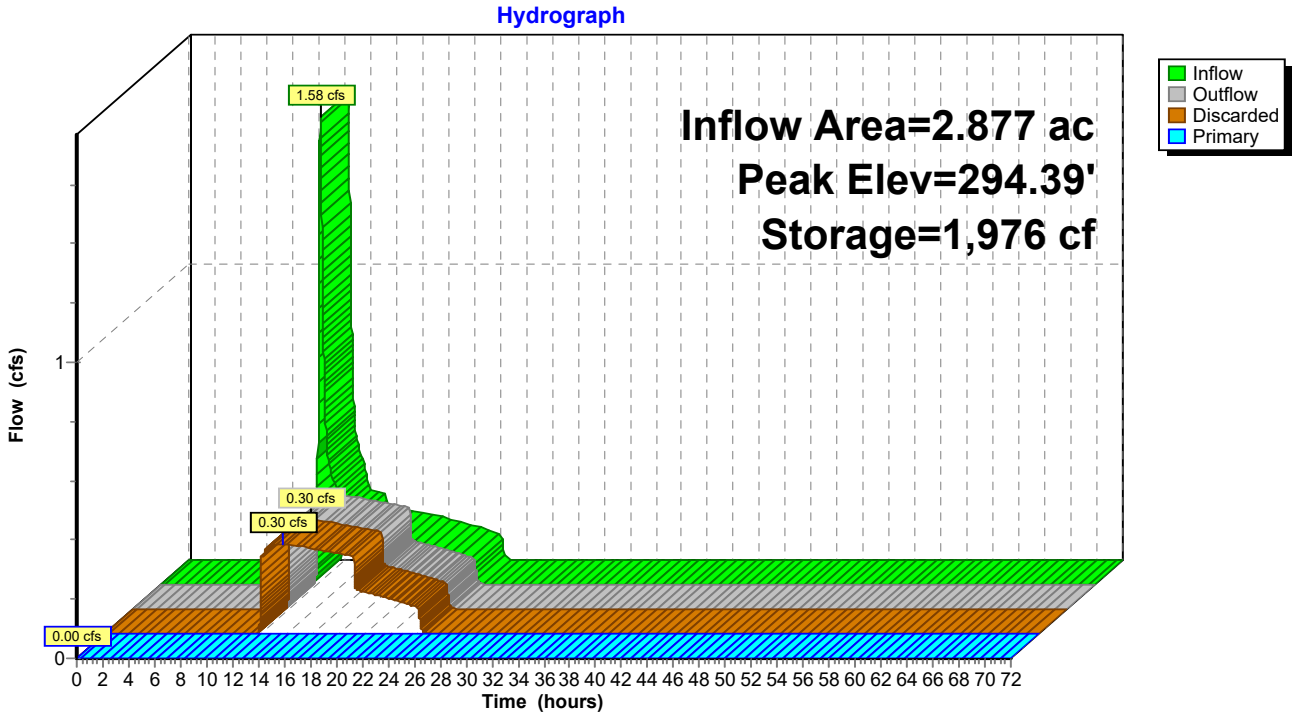
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	4,671	0	0
296.00	8,198	12,869	12,869

Device	Routing	Invert	Outlet Devices
#1	Primary	295.50'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	294.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.30 cfs @ 13.65 hrs HW=294.39' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=294.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 2.611 ac, 6.60% Impervious, Inflow Depth = 1.04" for 10-Year event
Inflow = 2.93 cfs @ 12.14 hrs, Volume= 0.227 af
Outflow = 0.36 cfs @ 13.15 hrs, Volume= 0.227 af, Atten= 88%, Lag= 60.8 min
Discarded = 0.36 cfs @ 13.15 hrs, Volume= 0.227 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-2P : AP-2P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 293.35' @ 13.15 hrs Surf.Area= 6,372 sf Storage= 2,035 cf

Plug-Flow detention time= 43.6 min calculated for 0.227 af (100% of inflow)
Center-of-Mass det. time= 43.6 min (984.4 - 940.8)

Volume	Invert	Avail.Storage	Storage Description
#1	293.00'	15,612 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

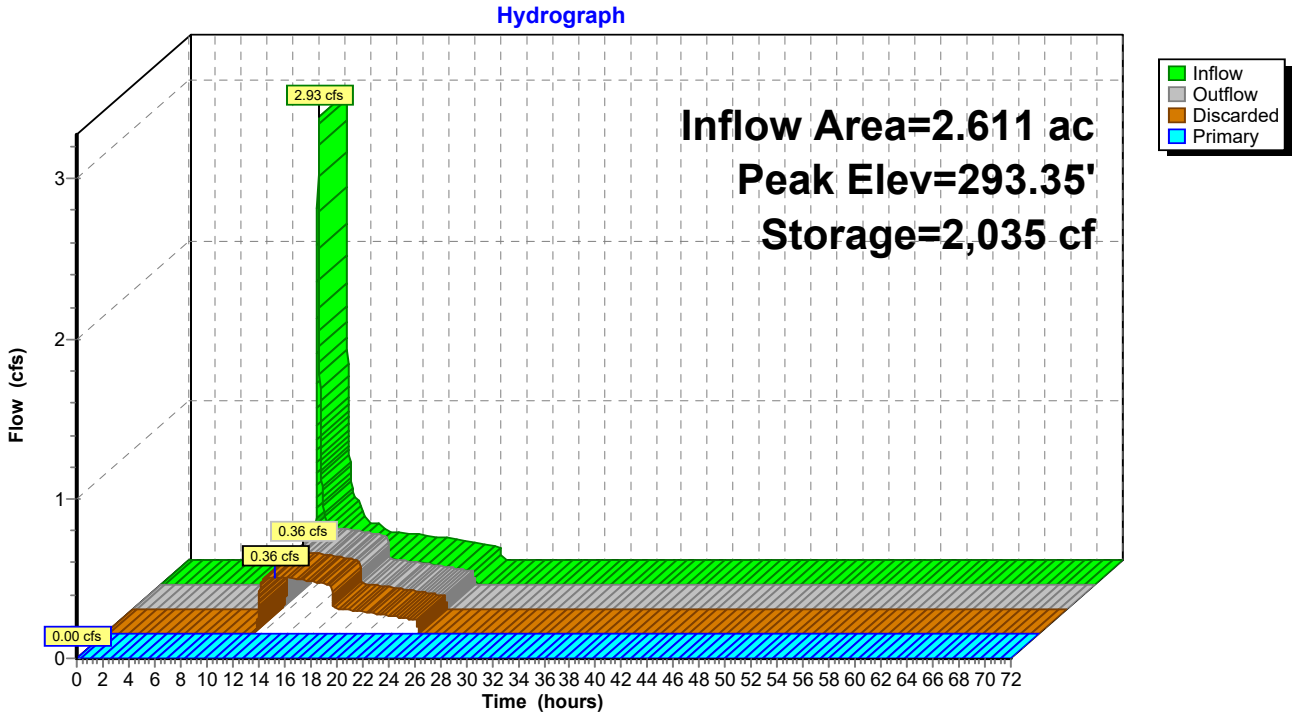
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.00	5,409	0	0
294.00	8,198	6,804	6,804
295.00	9,418	8,808	15,612

Device	Routing	Invert	Outlet Devices
#1	Discarded	293.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	293.83'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.36 cfs @ 13.15 hrs HW=293.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=293.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



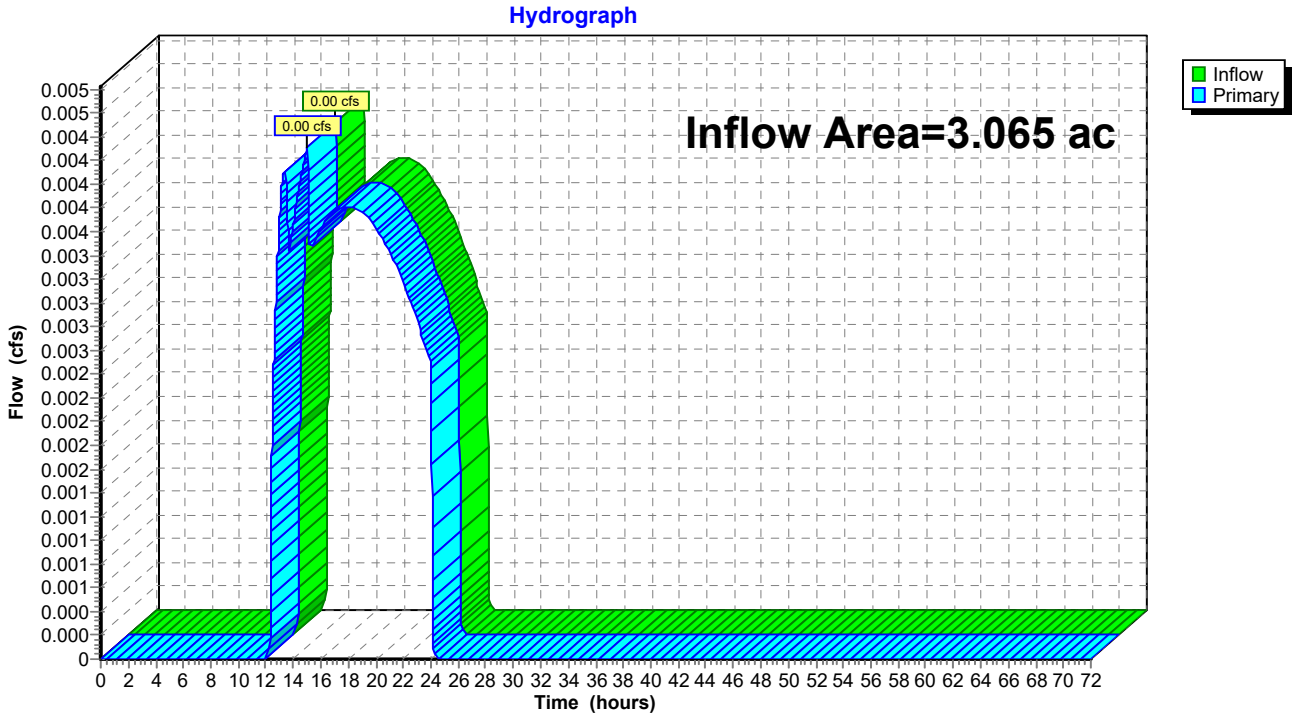
Summary for Pond AP-1P: AP-1P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.065 ac, 5.13% Impervious, Inflow Depth = 0.01" for 10-Year event
Inflow = 0.00 cfs @ 15.02 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 15.02 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-1P: AP-1P



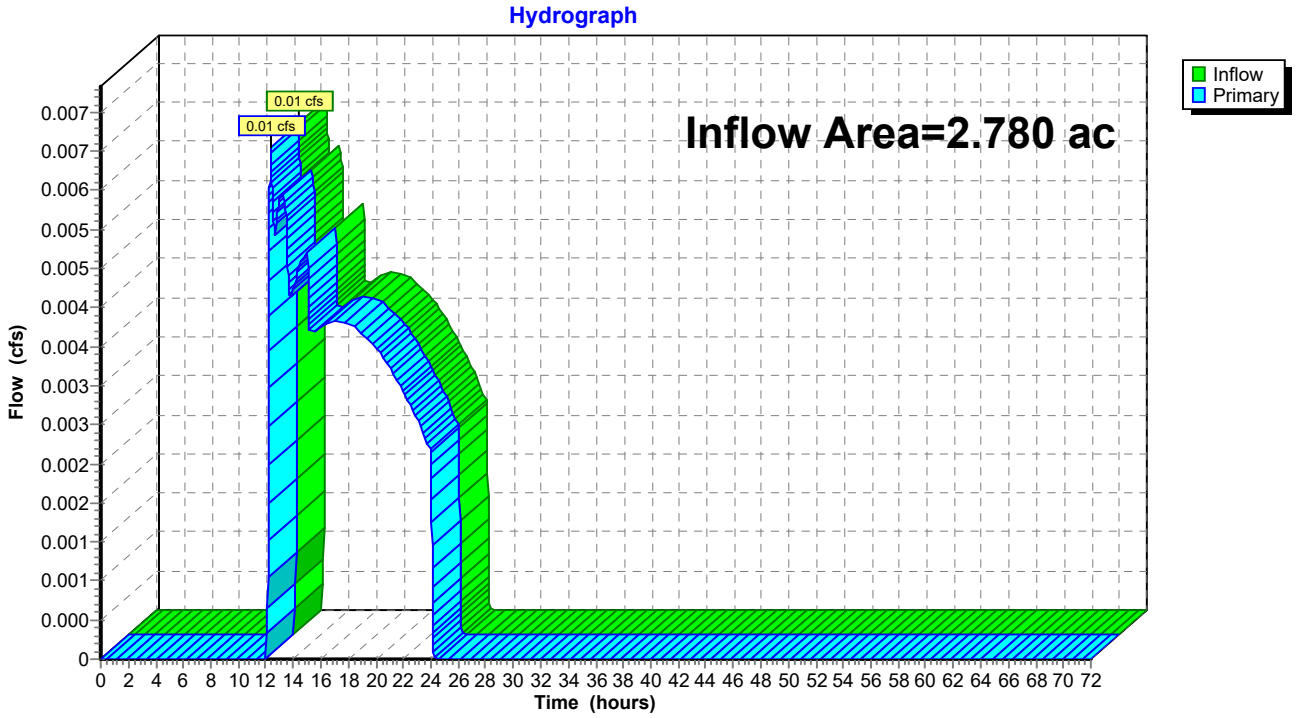
Summary for Pond AP-2P: AP-2P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.780 ac, 6.33% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.01 cfs @ 12.35 hrs, Volume= 0.004 af
Primary = 0.01 cfs @ 12.35 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-2P: AP-2P



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=8,206 sf 7.69% Impervious Runoff Depth=0.51"
Tc=6.0 min CN=38 Runoff=0.03 cfs 0.008 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=2.877 ac 4.96% Impervious Runoff Depth=1.51"
Flow Length=659' Tc=17.0 min CN=52 Runoff=3.08 cfs 0.362 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=2.611 ac 6.60% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=54 Runoff=5.13 cfs 0.364 af

Subcatchment PR-4: Subcat PR-4 Runoff Area=7,385 sf 2.14% Impervious Runoff Depth=0.63"
Tc=6.0 min CN=40 Runoff=0.06 cfs 0.009 af

Pond 1P: Infiltration Basin 1 Peak Elev=294.89' Storage=4,861 cf Inflow=3.08 cfs 0.362 af
Discarded=0.35 cfs 0.362 af Primary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.362 af

Pond 2P: Infiltration Basin 2 Peak Elev=293.72' Storage=4,630 cf Inflow=5.13 cfs 0.364 af
Discarded=0.41 cfs 0.364 af Primary=0.00 cfs 0.000 af Outflow=0.41 cfs 0.364 af

Pond AP-1P: AP-1P Inflow=0.03 cfs 0.008 af
Primary=0.03 cfs 0.008 af

Pond AP-2P: AP-2P Inflow=0.06 cfs 0.009 af
Primary=0.06 cfs 0.009 af

Total Runoff Area = 5.845 ac Runoff Volume = 0.743 af Average Runoff Depth = 1.53"
94.30% Pervious = 5.512 ac 5.70% Impervious = 0.333 ac

Summary for Subcatchment PR-1: Subcat PR-1

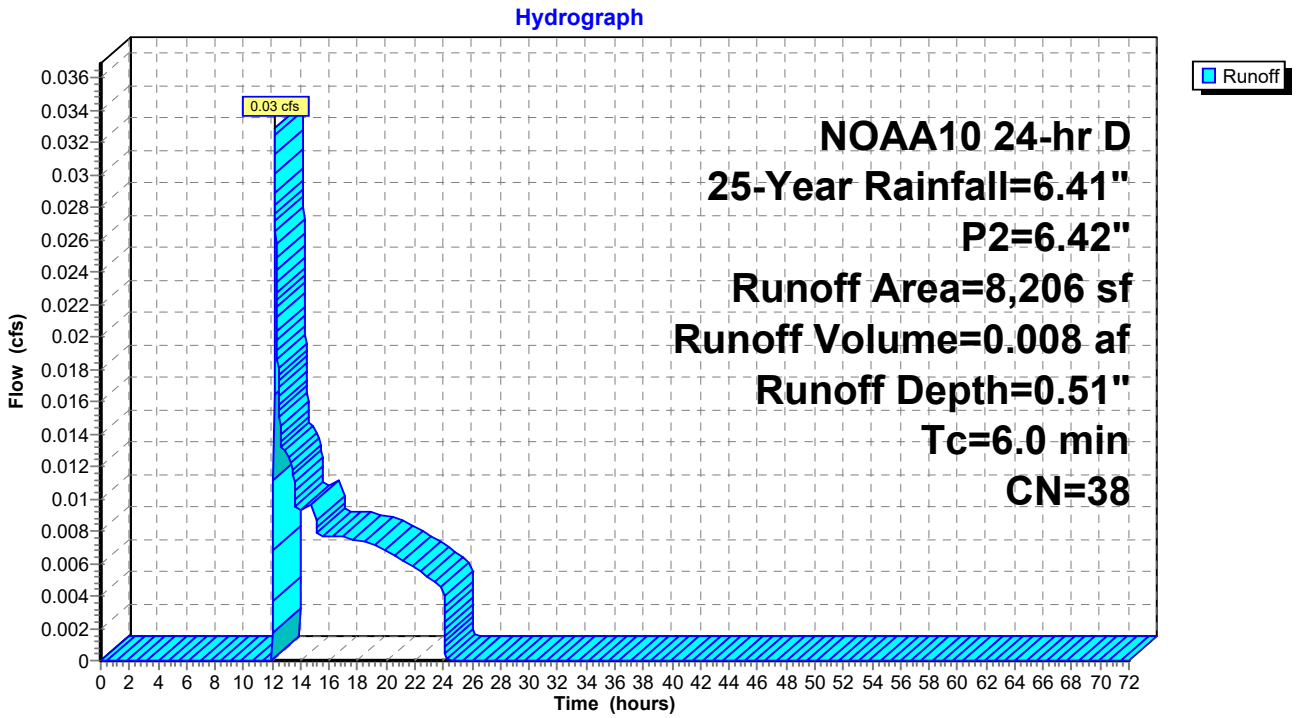
Runoff = 0.03 cfs @ 12.17 hrs, Volume= 0.008 af, Depth= 0.51"
Routed to Pond AP-1P : AP-1P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.41", P2=6.42"

Area (sf)	CN	Description
2,525	54	1/2 acre lots, 25% imp, HSG A
579	39	>75% Grass cover, Good, HSG A
5,102	30	Woods, Good, HSG A
8,206	38	Weighted Average
7,575		92.31% Pervious Area
631		7.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-1: Subcat PR-1



Summary for Subcatchment PR-2: Subcat PR-2

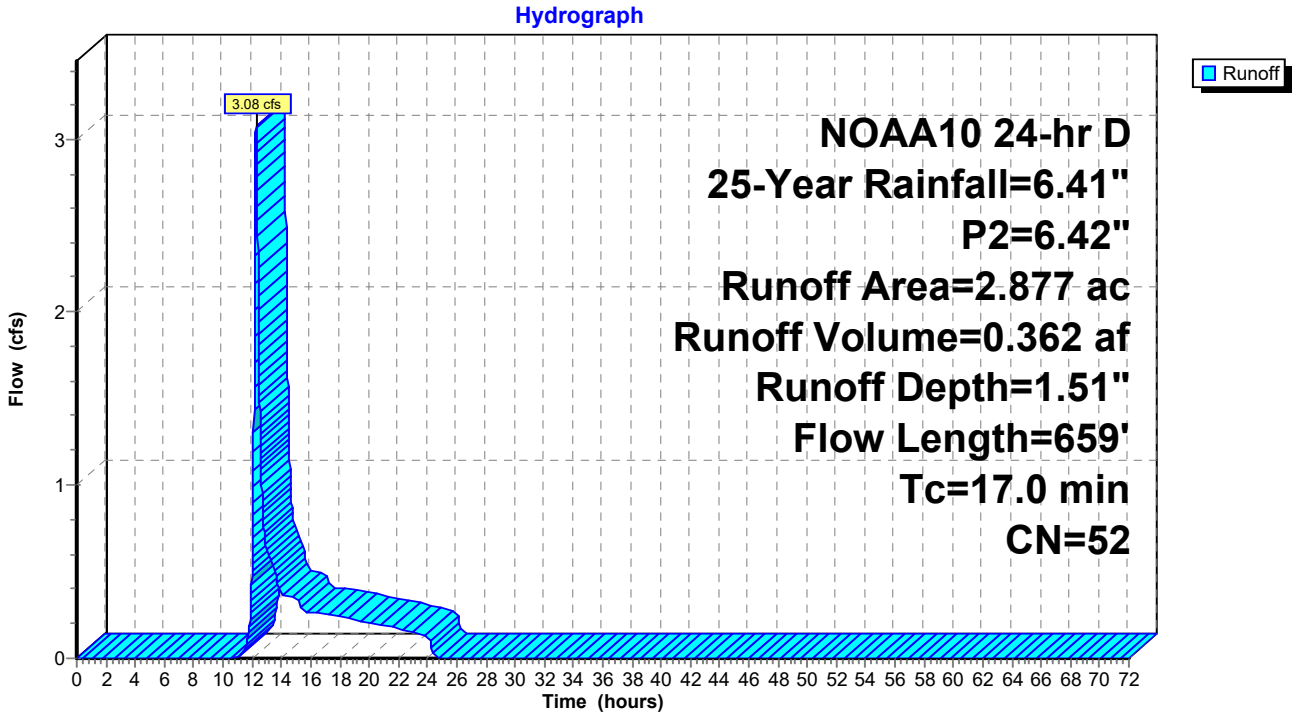
Runoff = 3.08 cfs @ 12.27 hrs, Volume= 0.362 af, Depth= 1.51"
Routed to Pond 1P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.41", P2=6.42"

Area (ac)	CN	Description
0.076	54	1/2 acre lots, 25% imp, HSG A
0.584	39	>75% Grass cover, Good, HSG A
0.183	61	>75% Grass cover, Good, HSG B
0.064	98	Paved parking, HSG A
0.059	98	Roofs, HSG A
0.177	30	Woods, Good, HSG A
1.733	55	Woods, Good, HSG B
2.877	52	Weighted Average
2.734		95.04% Pervious Area
0.143		4.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0280	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 6.42"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	403	0.0320	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	107	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
17.0	659	Total			

Subcatchment PR-2: Subcat PR-2



Summary for Subcatchment PR-3: Subcat PR-3

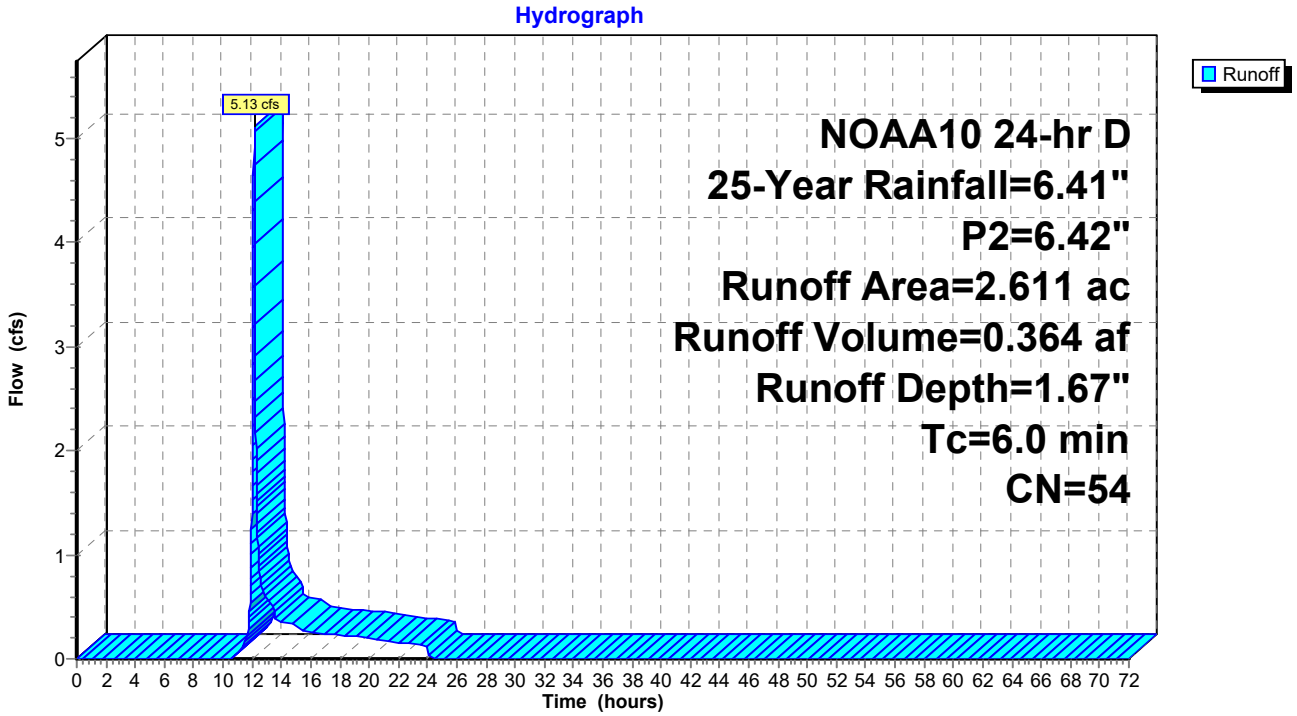
Runoff = 5.13 cfs @ 12.14 hrs, Volume= 0.364 af, Depth= 1.67"
Routed to Pond 2P : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.41", P2=6.42"

Area (ac)	CN	Description
0.192	54	1/2 acre lots, 25% imp, HSG A
0.499	39	>75% Grass cover, Good, HSG A
0.376	61	>75% Grass cover, Good, HSG B
0.065	98	Paved parking, HSG A
0.031	98	Roofs, HSG A
0.028	98	Roofs, HSG B
0.095	30	Woods, Good, HSG A
1.325	55	Woods, Good, HSG B
2.611	54	Weighted Average
2.438		93.40% Pervious Area
0.172		6.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-3: Subcat PR-3



Summary for Subcatchment PR-4: Subcat PR-4

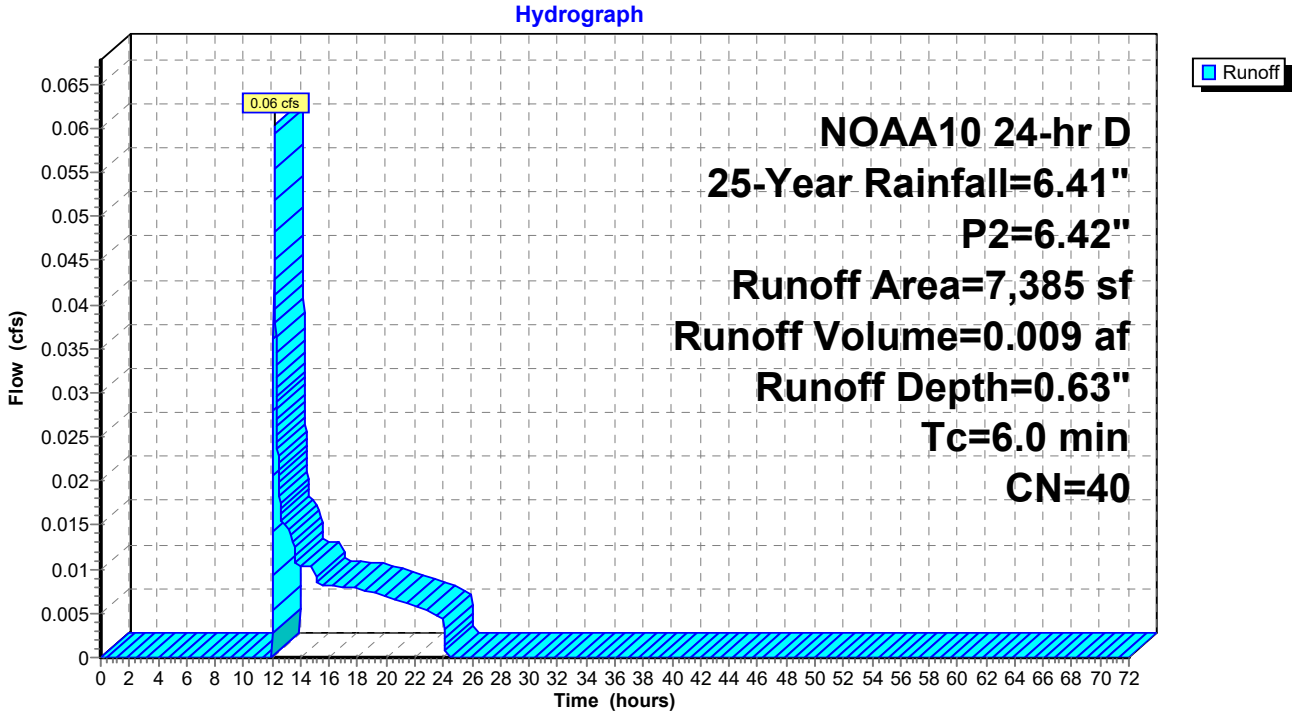
Runoff = 0.06 cfs @ 12.16 hrs, Volume= 0.009 af, Depth= 0.63"
Routed to Pond AP-2P : AP-2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.41", P2=6.42"

Area (sf)	CN	Description
633	54	1/2 acre lots, 25% imp, HSG A
1,640	39	>75% Grass cover, Good, HSG A
70	61	>75% Grass cover, Good, HSG B
3,335	30	Woods, Good, HSG A
1,707	55	Woods, Good, HSG B
7,385	40	Weighted Average
7,227		97.86% Pervious Area
158		2.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-4: Subcat PR-4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 2.877 ac, 4.96% Impervious, Inflow Depth = 1.51" for 25-Year event
Inflow = 3.08 cfs @ 12.27 hrs, Volume= 0.362 af
Outflow = 0.35 cfs @ 15.06 hrs, Volume= 0.362 af, Atten= 89%, Lag= 167.3 min
Discarded = 0.35 cfs @ 15.06 hrs, Volume= 0.362 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-1P : AP-1P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 294.89' @ 15.06 hrs Surf.Area= 6,242 sf Storage= 4,861 cf

Plug-Flow detention time= 164.4 min calculated for 0.362 af (100% of inflow)
Center-of-Mass det. time= 164.4 min (1,102.2 - 937.8)

Volume	Invert	Avail.Storage	Storage Description
#1	294.00'	12,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

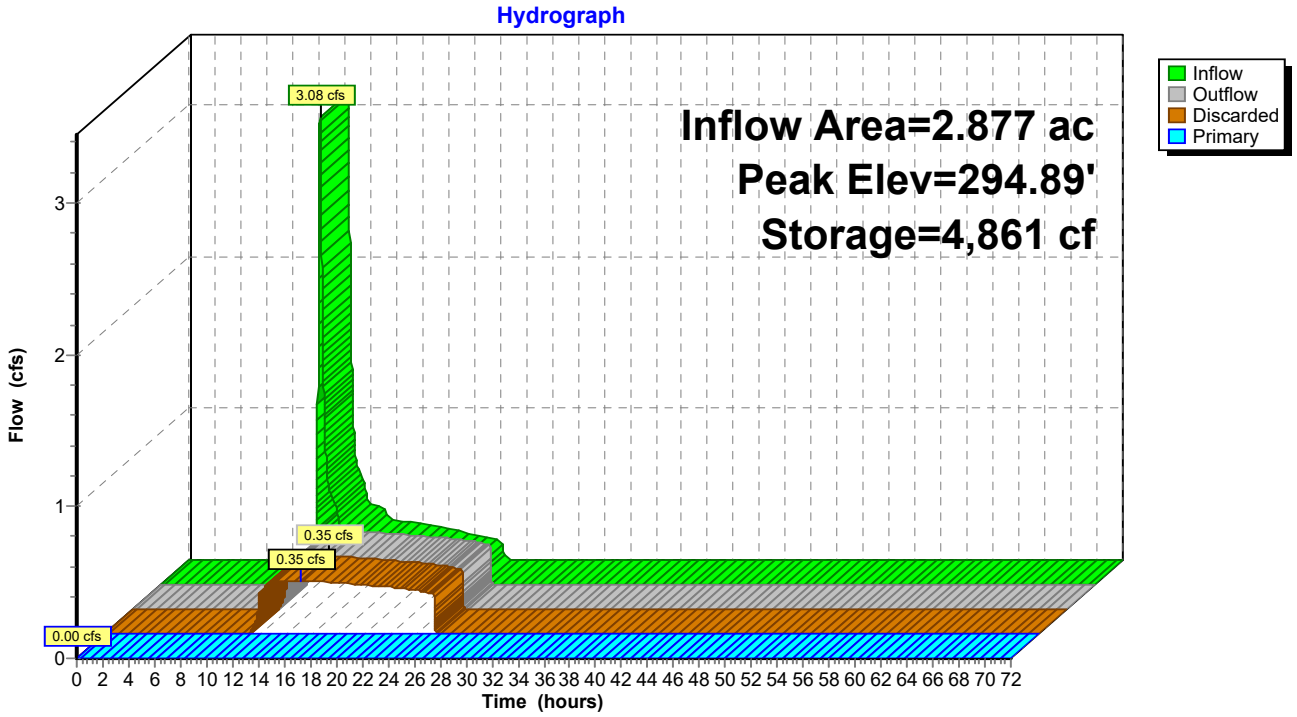
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	4,671	0	0
296.00	8,198	12,869	12,869

Device	Routing	Invert	Outlet Devices
#1	Primary	295.50'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	294.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.35 cfs @ 15.06 hrs HW=294.89' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=294.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 2.611 ac, 6.60% Impervious, Inflow Depth = 1.67" for 25-Year event
Inflow = 5.13 cfs @ 12.14 hrs, Volume= 0.364 af
Outflow = 0.41 cfs @ 13.58 hrs, Volume= 0.364 af, Atten= 92%, Lag= 86.5 min
Discarded = 0.41 cfs @ 13.58 hrs, Volume= 0.364 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond AP-2P : AP-2P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 293.72' @ 13.58 hrs Surf.Area= 7,422 sf Storage= 4,630 cf

Plug-Flow detention time= 115.7 min calculated for 0.364 af (100% of inflow)
Center-of-Mass det. time= 115.7 min (1,035.3 - 919.6)

Volume	Invert	Avail.Storage	Storage Description
#1	293.00'	15,612 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

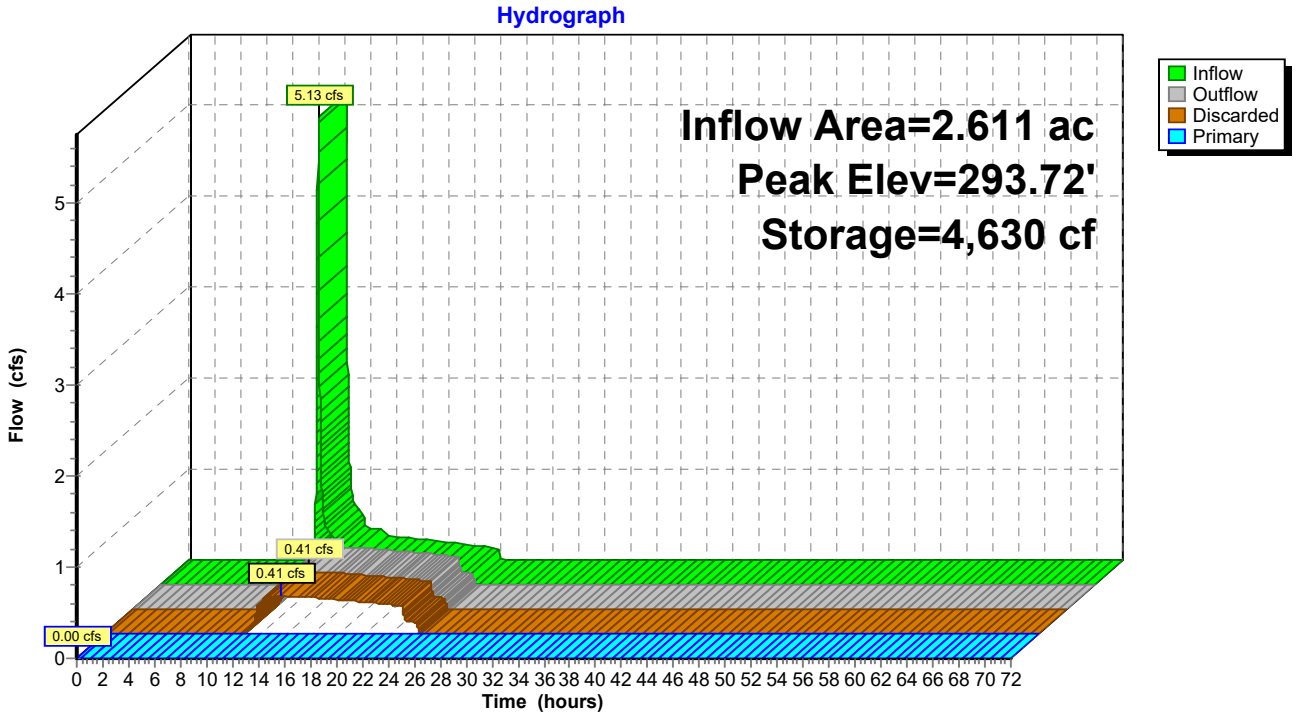
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.00	5,409	0	0
294.00	8,198	6,804	6,804
295.00	9,418	8,808	15,612

Device	Routing	Invert	Outlet Devices
#1	Discarded	293.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	293.83'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.41 cfs @ 13.58 hrs HW=293.72' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=293.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



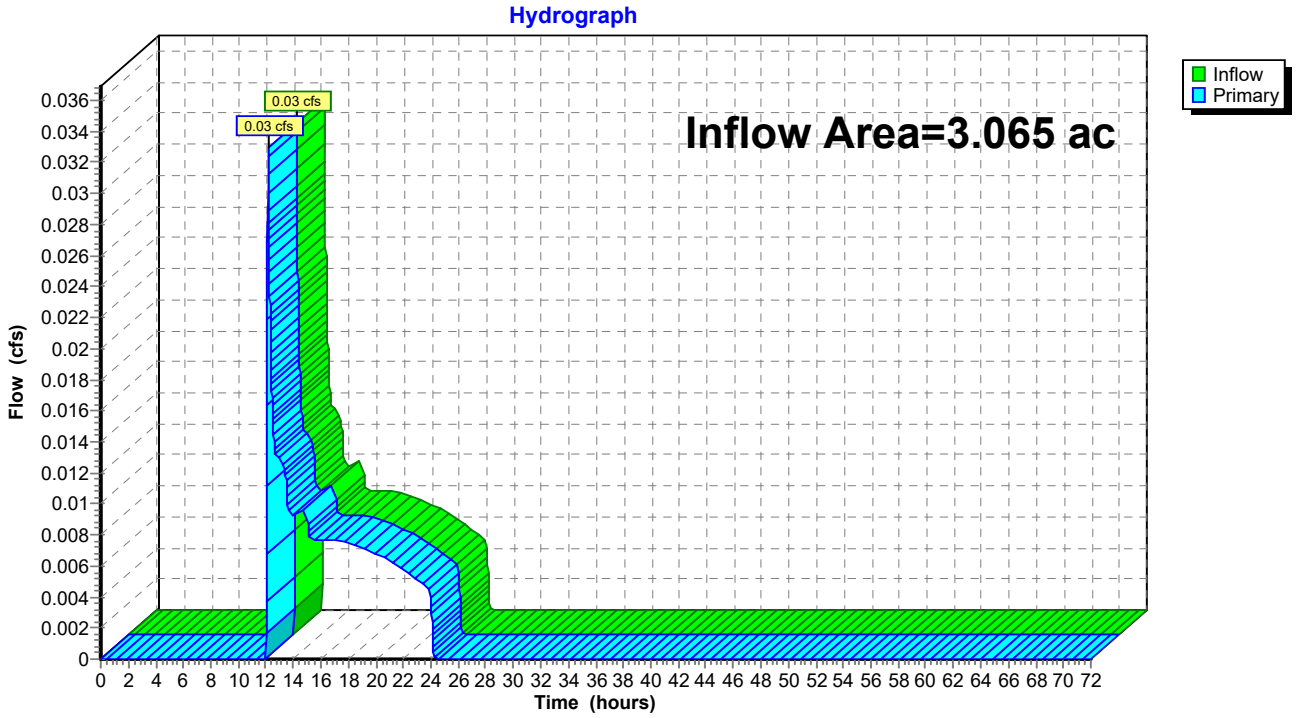
Summary for Pond AP-1P: AP-1P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.065 ac, 5.13% Impervious, Inflow Depth = 0.03" for 25-Year event
Inflow = 0.03 cfs @ 12.17 hrs, Volume= 0.008 af
Primary = 0.03 cfs @ 12.17 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-1P: AP-1P



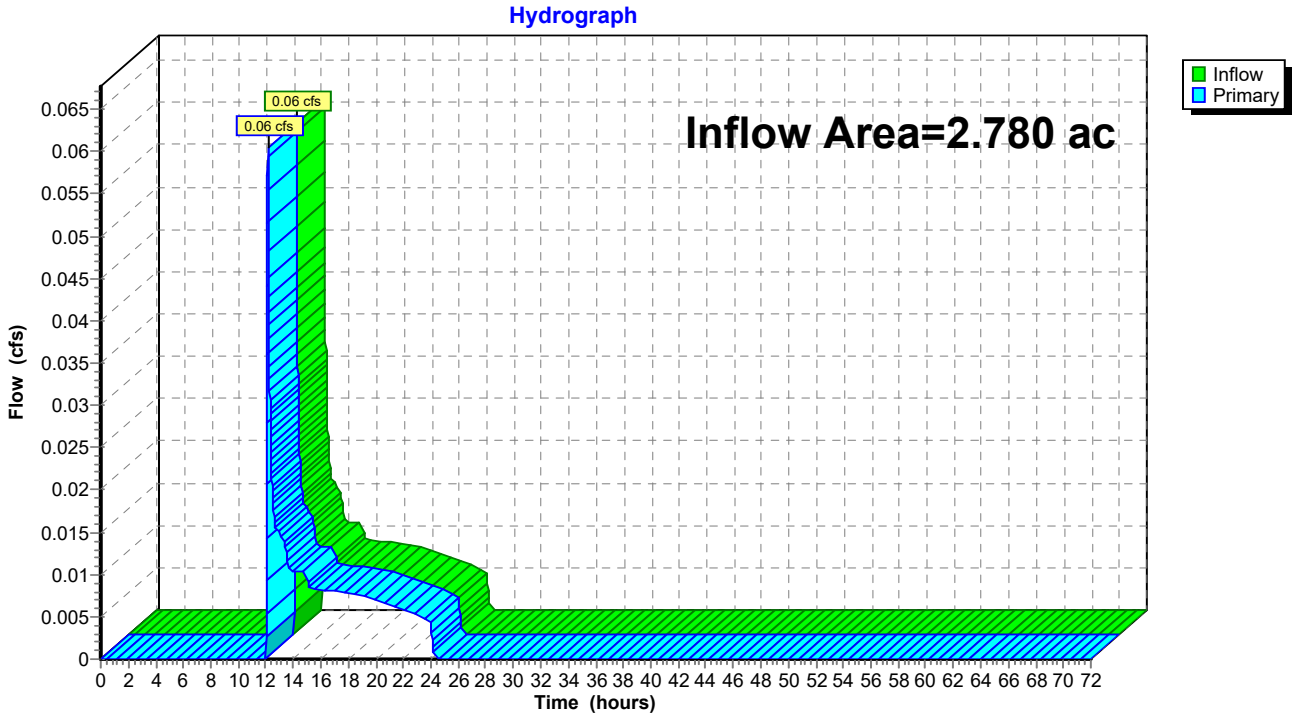
Summary for Pond AP-2P: AP-2P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.780 ac, 6.33% Impervious, Inflow Depth = 0.04" for 25-Year event
Inflow = 0.06 cfs @ 12.16 hrs, Volume= 0.009 af
Primary = 0.06 cfs @ 12.16 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-2P: AP-2P



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=8,206 sf 7.69% Impervious Runoff Depth=1.14"
Tc=6.0 min CN=38 Runoff=0.19 cfs 0.018 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=2.877 ac 4.96% Impervious Runoff Depth=2.58"
Flow Length=659' Tc=16.1 min CN=52 Runoff=5.91 cfs 0.619 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=2.611 ac 6.60% Impervious Runoff Depth=2.80"
Tc=6.0 min CN=54 Runoff=8.99 cfs 0.610 af

Subcatchment PR-4: Subcat PR-4 Runoff Area=7,385 sf 2.14% Impervious Runoff Depth=1.33"
Tc=6.0 min CN=40 Runoff=0.22 cfs 0.019 af

Pond 1P: Infiltration Basin 1 Peak Elev=295.57' Storage=9,474 cf Inflow=5.91 cfs 0.619 af
Discarded=0.41 cfs 0.572 af Primary=0.39 cfs 0.048 af Outflow=0.81 cfs 0.619 af

Pond 2P: Infiltration Basin 2 Peak Elev=293.99' Storage=6,742 cf Inflow=8.99 cfs 0.610 af
Discarded=0.46 cfs 0.497 af Primary=1.53 cfs 0.113 af Outflow=1.99 cfs 0.610 af

Pond AP-1P: AP-1P Inflow=0.42 cfs 0.066 af
Primary=0.42 cfs 0.066 af

Pond AP-2P: AP-2P Inflow=1.60 cfs 0.131 af
Primary=1.60 cfs 0.131 af

Total Runoff Area = 5.845 ac Runoff Volume = 1.266 af Average Runoff Depth = 2.60"
94.30% Pervious = 5.512 ac 5.70% Impervious = 0.333 ac

Summary for Subcatchment PR-1: Subcat PR-1

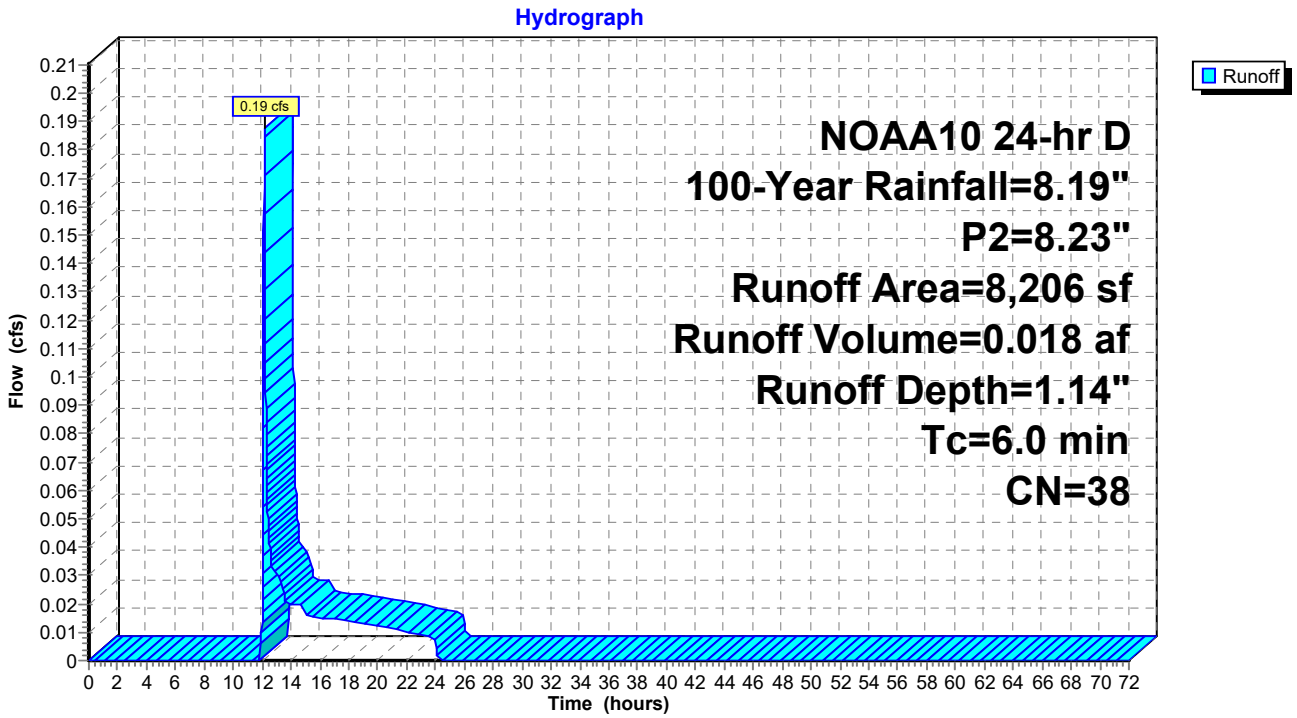
Runoff = 0.19 cfs @ 12.15 hrs, Volume= 0.018 af, Depth= 1.14"
Routed to Pond AP-1P : AP-1P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.19", P2=8.23"

Area (sf)	CN	Description
2,525	54	1/2 acre lots, 25% imp, HSG A
579	39	>75% Grass cover, Good, HSG A
5,102	30	Woods, Good, HSG A
8,206	38	Weighted Average
7,575		92.31% Pervious Area
631		7.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-1: Subcat PR-1



Summary for Subcatchment PR-2: Subcat PR-2

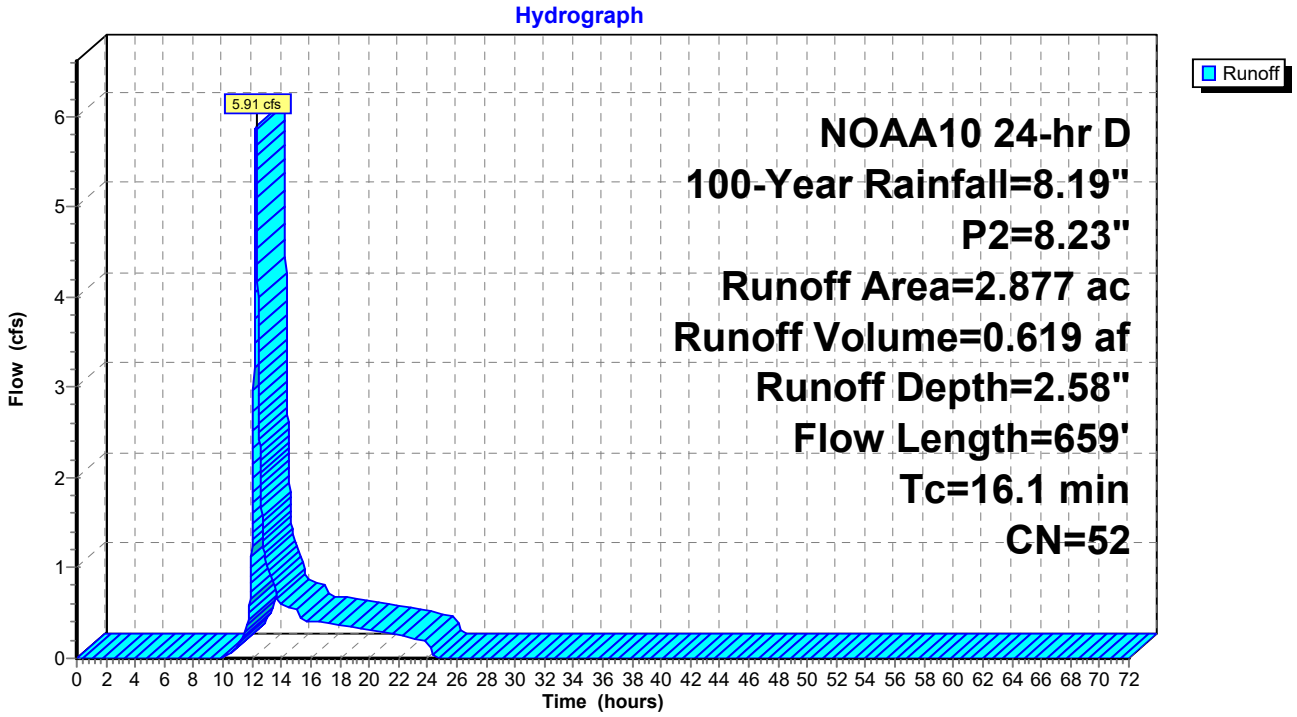
Runoff = 5.91 cfs @ 12.25 hrs, Volume= 0.619 af, Depth= 2.58"
Routed to Pond 1P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.19", P2=8.23"

Area (ac)	CN	Description
0.076	54	1/2 acre lots, 25% imp, HSG A
0.584	39	>75% Grass cover, Good, HSG A
0.183	61	>75% Grass cover, Good, HSG B
0.064	98	Paved parking, HSG A
0.059	98	Roofs, HSG A
0.177	30	Woods, Good, HSG A
1.733	55	Woods, Good, HSG B
2.877	52	Weighted Average
2.734		95.04% Pervious Area
0.143		4.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0280	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 8.23"
1.2	99	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	403	0.0320	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	107	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
16.1	659	Total			

Subcatchment PR-2: Subcat PR-2



Summary for Subcatchment PR-3: Subcat PR-3

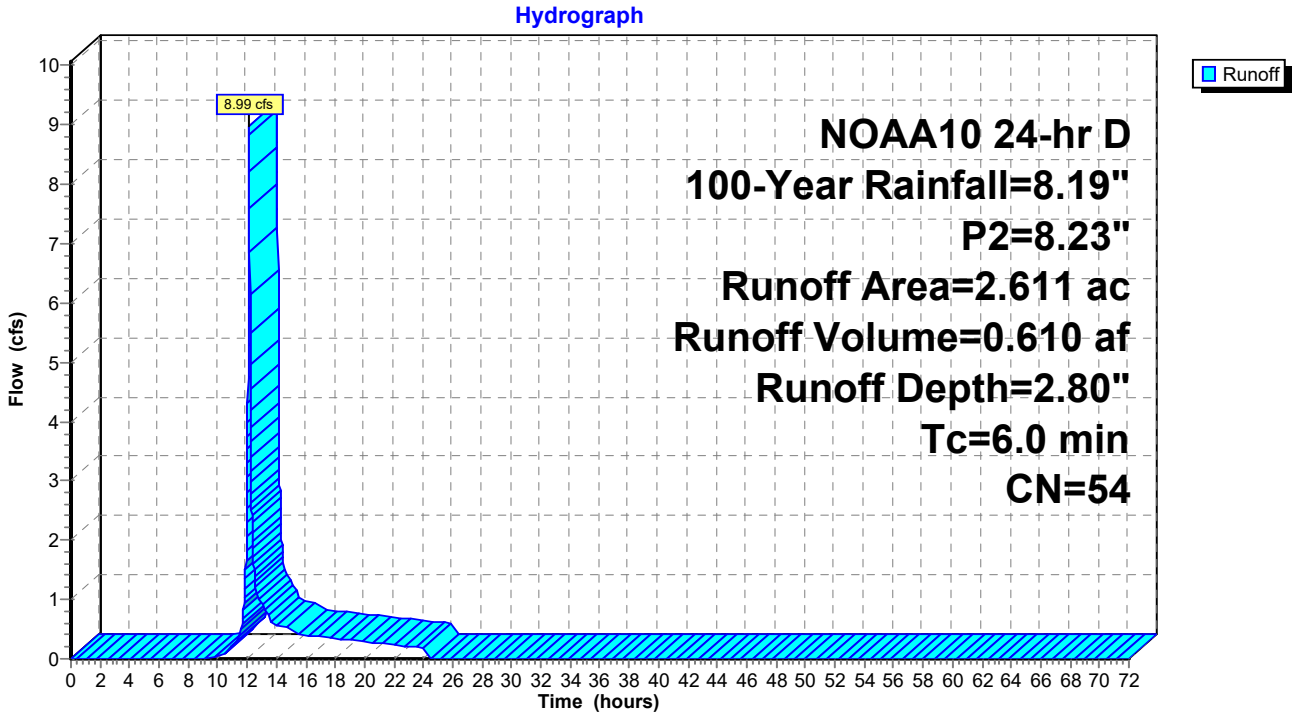
Runoff = 8.99 cfs @ 12.14 hrs, Volume= 0.610 af, Depth= 2.80"
Routed to Pond 2P : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.19", P2=8.23"

Area (ac)	CN	Description
0.192	54	1/2 acre lots, 25% imp, HSG A
0.499	39	>75% Grass cover, Good, HSG A
0.376	61	>75% Grass cover, Good, HSG B
0.065	98	Paved parking, HSG A
0.031	98	Roofs, HSG A
0.028	98	Roofs, HSG B
0.095	30	Woods, Good, HSG A
1.325	55	Woods, Good, HSG B
2.611	54	Weighted Average
2.438		93.40% Pervious Area
0.172		6.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-3: Subcat PR-3



Summary for Subcatchment PR-4: Subcat PR-4

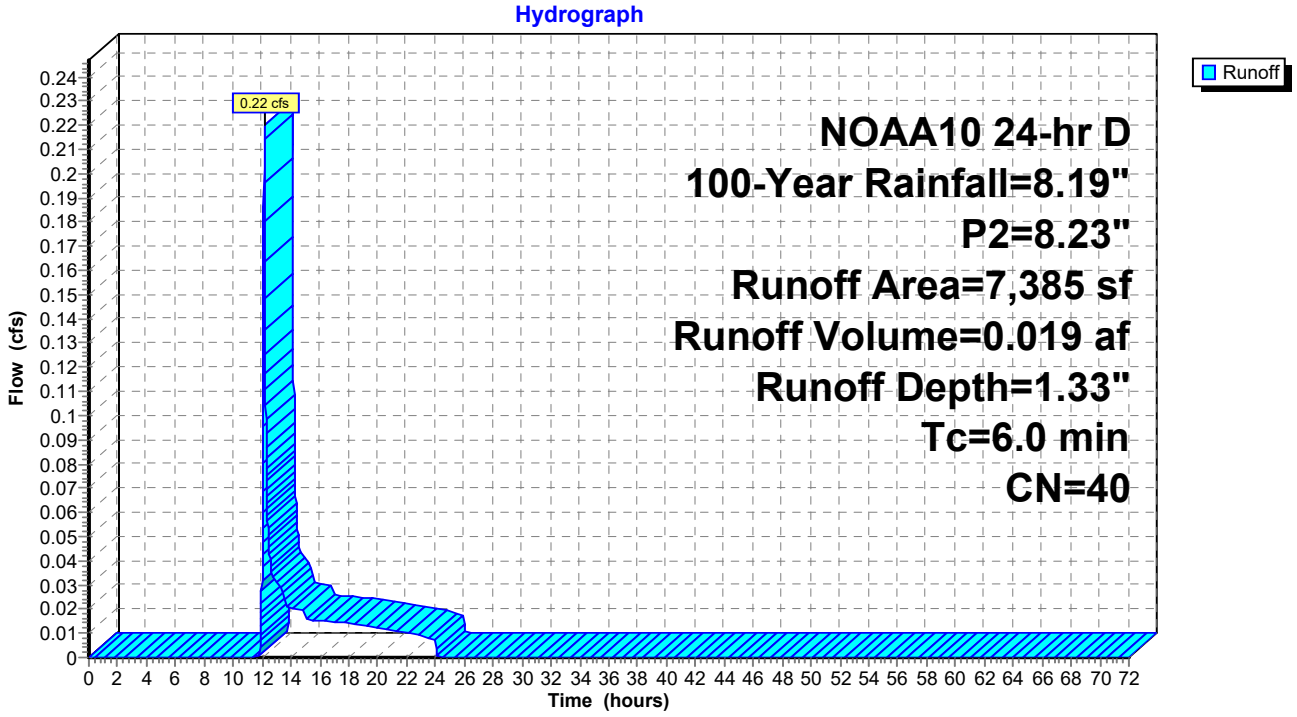
Runoff = 0.22 cfs @ 12.14 hrs, Volume= 0.019 af, Depth= 1.33"
Routed to Pond AP-2P : AP-2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.19", P2=8.23"

Area (sf)	CN	Description
633	54	1/2 acre lots, 25% imp, HSG A
1,640	39	>75% Grass cover, Good, HSG A
70	61	>75% Grass cover, Good, HSG B
3,335	30	Woods, Good, HSG A
1,707	55	Woods, Good, HSG B
7,385	40	Weighted Average
7,227		97.86% Pervious Area
158		2.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR-4: Subcat PR-4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 2.877 ac, 4.96% Impervious, Inflow Depth = 2.58" for 100-Year event
Inflow = 5.91 cfs @ 12.25 hrs, Volume= 0.619 af
Outflow = 0.81 cfs @ 13.54 hrs, Volume= 0.619 af, Atten= 86%, Lag= 77.2 min
Discarded = 0.41 cfs @ 13.54 hrs, Volume= 0.572 af
Primary = 0.39 cfs @ 13.54 hrs, Volume= 0.048 af
Routed to Pond AP-1P : AP-1P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 295.57' @ 13.54 hrs Surf.Area= 7,432 sf Storage= 9,474 cf

Plug-Flow detention time= 262.4 min calculated for 0.619 af (100% of inflow)
Center-of-Mass det. time= 262.4 min (1,176.6 - 914.2)

Volume	Invert	Avail.Storage	Storage Description
#1	294.00'	12,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

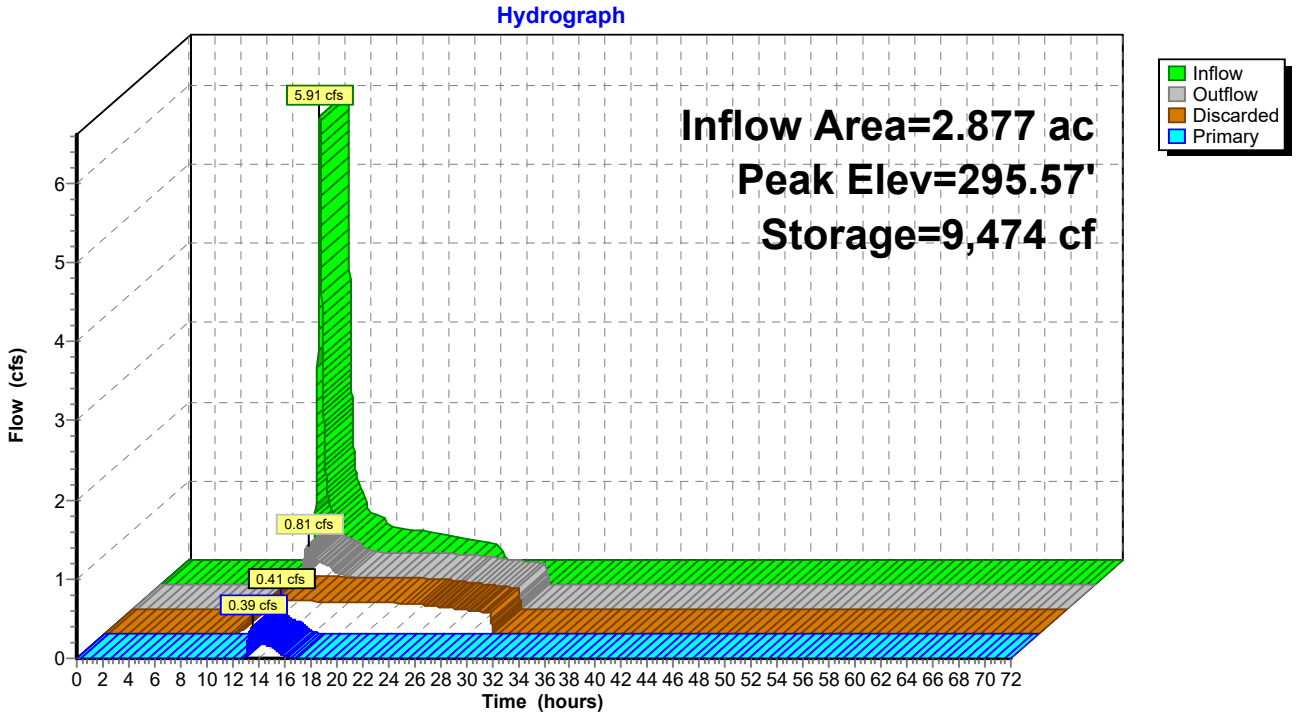
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	4,671	0	0
296.00	8,198	12,869	12,869

Device	Routing	Invert	Outlet Devices
#1	Primary	295.50'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	294.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.41 cfs @ 13.54 hrs HW=295.57' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=0.39 cfs @ 13.54 hrs HW=295.57' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.60 fps)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 2.611 ac, 6.60% Impervious, Inflow Depth = 2.80" for 100-Year event
Inflow = 8.99 cfs @ 12.14 hrs, Volume= 0.610 af
Outflow = 1.99 cfs @ 12.37 hrs, Volume= 0.610 af, Atten= 78%, Lag= 14.1 min
Discarded = 0.46 cfs @ 12.37 hrs, Volume= 0.497 af
Primary = 1.53 cfs @ 12.37 hrs, Volume= 0.113 af
Routed to Pond AP-2P : AP-2P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 293.99' @ 12.37 hrs Surf.Area= 8,177 sf Storage= 6,742 cf

Plug-Flow detention time= 132.7 min calculated for 0.610 af (100% of inflow)
Center-of-Mass det. time= 132.7 min (1,030.9 - 898.2)

Volume	Invert	Avail.Storage	Storage Description
#1	293.00'	15,612 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

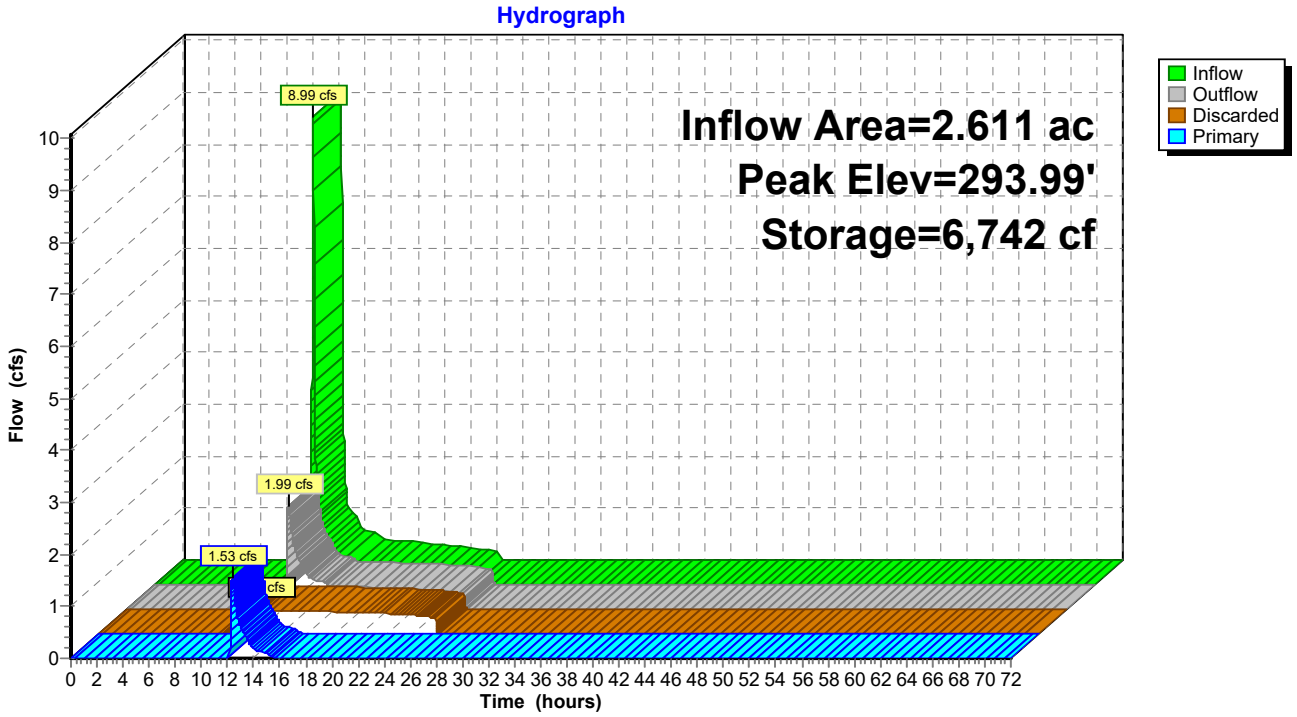
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.00	5,409	0	0
294.00	8,198	6,804	6,804
295.00	9,418	8,808	15,612

Device	Routing	Invert	Outlet Devices
#1	Discarded	293.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	293.83'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.46 cfs @ 12.37 hrs HW=293.99' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=1.53 cfs @ 12.37 hrs HW=293.99' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.53 cfs @ 0.94 fps)

Pond 2P: Infiltration Basin 2



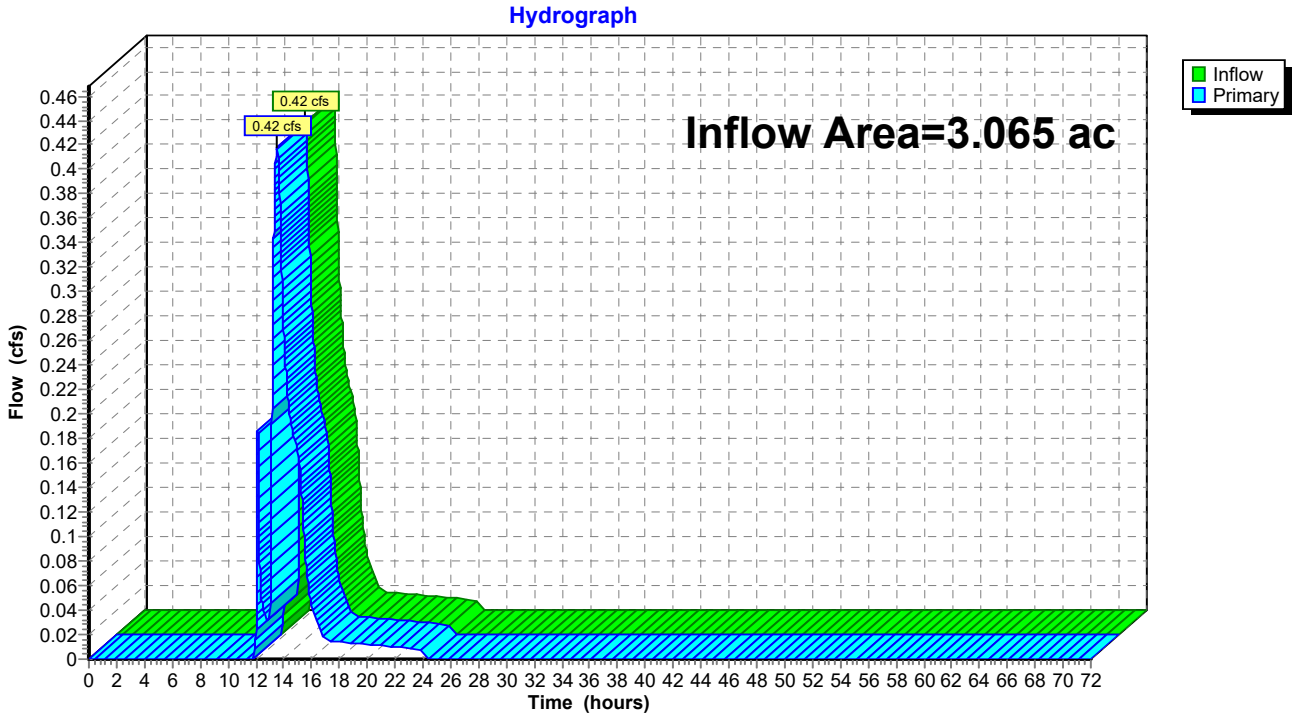
Summary for Pond AP-1P: AP-1P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.065 ac, 5.13% Impervious, Inflow Depth = 0.26" for 100-Year event
Inflow = 0.42 cfs @ 13.53 hrs, Volume= 0.066 af
Primary = 0.42 cfs @ 13.53 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-1P: AP-1P



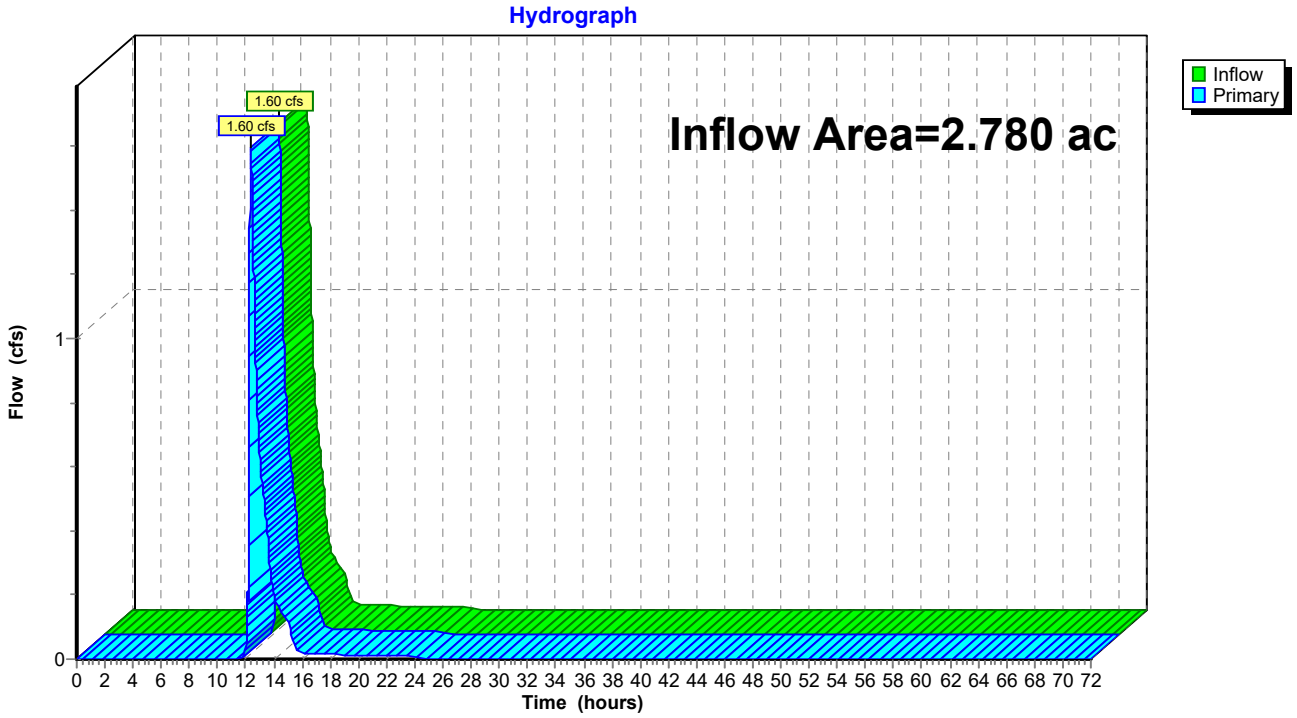
Summary for Pond AP-2P: AP-2P

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.780 ac, 6.33% Impervious, Inflow Depth = 0.57" for 100-Year event
Inflow = 1.60 cfs @ 12.37 hrs, Volume= 0.131 af
Primary = 1.60 cfs @ 12.37 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond AP-2P: AP-2P



Events for Subcatchment PR-1: Subcat PR-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.39	0.00	0.000	0.00
10-Year	5.25	0.00	0.003	0.22
25-Year	6.41	0.03	0.008	0.51
100-Year	**8.19**	**0.19**	**0.018**	**1.14**

Events for Subcatchment PR-2: Subcat PR-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.39	0.09	0.053	0.22
10-Year	5.25	1.58	0.220	0.92
25-Year	6.41	3.08	0.362	1.51
100-Year	**8.19**	**5.91**	**0.619**	**2.58**

Events for Subcatchment PR-3: Subcat PR-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.39	0.28	0.061	0.28
10-Year	5.25	2.93	0.227	1.04
25-Year	6.41	5.13	0.364	1.67
100-Year	**8.19**	**8.99**	**0.610**	**2.80**

Events for Subcatchment PR-4: Subcat PR-4

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	3.39	0.00	0.000	0.01
10-Year	5.25	0.01	0.004	0.29
25-Year	6.41	0.06	0.009	0.63
100-Year	**8.19**	**0.22**	**0.019**	**1.33**

Events for Pond 1P: Infiltration Basin 1

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.09	0.09	0.09	0.00	294.00	17
10-Year	1.58	0.30	0.30	0.00	294.39	1,976
25-Year	3.08	0.35	0.35	0.00	294.89	4,861
100-Year	**5.91**	**0.81**	**0.41**	**0.39**	**295.57**	**9,474**

Events for Pond 2P: Infiltration Basin 2

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.28	0.22	0.22	0.00	293.01	40
10-Year	2.93	0.36	0.36	0.00	293.35	2,035
25-Year	5.13	0.41	0.41	0.00	293.72	4,630
100-Year	**8.99**	**1.99**	**0.46**	**1.53**	**293.99**	**6,742**

Events for Pond AP-1P: AP-1P

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.00	0.00	**0.00**	**0.000**
10-Year	0.00	0.00	0.00	0.000
25-Year	0.03	0.03	0.00	0.000
100-Year	**0.42**	**0.42**	0.00	0.000

Events for Pond AP-2P: AP-2P

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.00	0.00	**0.00**	**0.000**
10-Year	0.01	0.01	0.00	0.000
25-Year	0.06	0.06	0.00	0.000
100-Year	**1.60**	**1.60**	0.00	0.000

Basin Drawdown Tabulation

Hydrograph for Pond 1P: Infiltration Basin 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	294.00	0.00	0.00	0.00
2.00	0.00	0	294.00	0.00	0.00	0.00
4.00	0.00	0	294.00	0.00	0.00	0.00
6.00	0.00	0	294.00	0.00	0.00	0.00
8.00	0.00	0	294.00	0.00	0.00	0.00
10.00	0.01	1	294.00	0.01	0.01	0.00
12.00	**1.31**	**586**	**294.12**	**0.27**	**0.27**	**0.00**
14.00	**0.59**	**9,348**	**295.55**	**0.66**	**0.41**	**0.25**
16.00	0.41	9,077	295.51	0.44	0.41	0.03
18.00	0.37	8,898	295.49	0.41	0.41	0.00
20.00	0.31	8,446	295.42	0.40	0.40	0.00
22.00	0.26	7,655	295.31	0.39	0.39	0.00
24.00	0.19	6,523	295.15	0.37	0.37	0.00
26.00	0.00	4,129	294.77	0.34	0.34	0.00
28.00	0.00	1,849	294.37	0.30	0.30	0.00
30.00	0.00	1	294.00	0.00	0.00	0.00
32.00	0.00	0	294.00	0.00	0.00	0.00
34.00	0.00	0	294.00	0.00	0.00	0.00
36.00	0.00	0	294.00	0.00	0.00	0.00
38.00	0.00	0	294.00	0.00	0.00	0.00
40.00	0.00	0	294.00	0.00	0.00	0.00
42.00	0.00	0	294.00	0.00	0.00	0.00
44.00	0.00	0	294.00	0.00	0.00	0.00
46.00	0.00	0	294.00	0.00	0.00	0.00
48.00	0.00	0	294.00	0.00	0.00	0.00
50.00	0.00	0	294.00	0.00	0.00	0.00
52.00	0.00	0	294.00	0.00	0.00	0.00
54.00	0.00	0	294.00	0.00	0.00	0.00
56.00	0.00	0	294.00	0.00	0.00	0.00
58.00	0.00	0	294.00	0.00	0.00	0.00
60.00	0.00	0	294.00	0.00	0.00	0.00
62.00	0.00	0	294.00	0.00	0.00	0.00
64.00	0.00	0	294.00	0.00	0.00	0.00
66.00	0.00	0	294.00	0.00	0.00	0.00
68.00	0.00	0	294.00	0.00	0.00	0.00
70.00	0.00	0	294.00	0.00	0.00	0.00
72.00	0.00	0	294.00	0.00	0.00	0.00

Hydrograph for Pond 2P: Infiltration Basin 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	293.00	0.00	0.00	0.00
2.00	0.00	0	293.00	0.00	0.00	0.00
4.00	0.00	0	293.00	0.00	0.00	0.00
6.00	0.00	0	293.00	0.00	0.00	0.00
8.00	0.00	0	293.00	0.00	0.00	0.00
10.00	0.05	8	293.00	0.04	0.04	0.00
12.00	**3.31**	**1,388**	**293.24**	**0.34**	**0.34**	**0.00**
14.00	**0.55**	**5,751**	**293.87**	**0.62**	**0.44**	**0.18**
16.00	0.39	5,450	293.83	0.43	0.43	0.00
18.00	0.35	5,034	293.78	0.42	0.42	0.00
20.00	0.29	4,355	293.68	0.41	0.41	0.00
22.00	0.24	3,410	293.55	0.39	0.39	0.00
24.00	0.18	2,217	293.37	0.36	0.36	0.00
26.00	0.00	3	293.00	0.02	0.02	0.00
28.00	0.00	0	293.00	0.00	0.00	0.00
30.00	0.00	0	293.00	0.00	0.00	0.00
32.00	0.00	0	293.00	0.00	0.00	0.00
34.00	0.00	0	293.00	0.00	0.00	0.00
36.00	0.00	0	293.00	0.00	0.00	0.00
38.00	0.00	0	293.00	0.00	0.00	0.00
40.00	0.00	0	293.00	0.00	0.00	0.00
42.00	0.00	0	293.00	0.00	0.00	0.00
44.00	0.00	0	293.00	0.00	0.00	0.00
46.00	0.00	0	293.00	0.00	0.00	0.00
48.00	0.00	0	293.00	0.00	0.00	0.00
50.00	0.00	0	293.00	0.00	0.00	0.00
52.00	0.00	0	293.00	0.00	0.00	0.00
54.00	0.00	0	293.00	0.00	0.00	0.00
56.00	0.00	0	293.00	0.00	0.00	0.00
58.00	0.00	0	293.00	0.00	0.00	0.00
60.00	0.00	0	293.00	0.00	0.00	0.00
62.00	0.00	0	293.00	0.00	0.00	0.00
64.00	0.00	0	293.00	0.00	0.00	0.00
66.00	0.00	0	293.00	0.00	0.00	0.00
68.00	0.00	0	293.00	0.00	0.00	0.00
70.00	0.00	0	293.00	0.00	0.00	0.00
72.00	0.00	0	293.00	0.00	0.00	0.00

Stage-Area-Storage for Pond 1P: Infiltration Basin 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
294.00	4,671	0
294.02	4,706	94
294.04	4,742	188
294.06	4,777	283
294.08	4,812	379
294.10	4,847	476
294.12	4,883	573
294.14	4,918	671
294.16	4,953	770
294.18	4,988	869
294.20	5,024	969
294.22	5,059	1,070
294.24	5,094	1,172
294.26	5,130	1,274
294.28	5,165	1,377
294.30	5,200	1,481
294.32	5,235	1,585
294.34	5,271	1,690
294.36	5,306	1,796
294.38	5,341	1,902
294.40	5,376	2,009
294.42	5,412	2,117
294.44	5,447	2,226
294.46	5,482	2,335
294.48	5,517	2,445
294.50	5,553	2,556
294.52	5,588	2,667
294.54	5,623	2,779
294.56	5,659	2,892
294.58	5,694	3,006
294.60	5,729	3,120
294.62	5,764	3,235
294.64	5,800	3,351
294.66	5,835	3,467
294.68	5,870	3,584
294.70	5,905	3,702
294.72	5,941	3,820
294.74	5,976	3,939
294.76	6,011	4,059
294.78	6,047	4,180
294.80	6,082	4,301
294.82	6,117	4,423
294.84	6,152	4,546
294.86	6,188	4,669
294.88	6,223	4,793
294.90	6,258	4,918
294.92	6,293	5,044
294.94	6,329	5,170
294.96	6,364	5,297
294.98	6,399	5,424
295.00	6,435	5,553
295.02	6,470	5,682
295.04	6,505	5,812
295.06	6,540	5,942
295.08	6,576	6,073
295.10	6,611	6,205
295.12	6,646	6,338
295.14	6,681	6,471
295.16	6,717	6,605
295.18	6,752	6,740
295.20	6,787	6,875
295.22	6,822	7,011
295.24	6,858	7,148
295.26	6,893	7,285
295.28	6,928	7,424
295.30	6,964	7,562
295.32	6,999	7,702
295.34	7,034	7,842
295.36	7,069	7,983
295.38	7,105	8,125
295.40	7,140	8,268
295.42	7,175	8,411
295.44	7,210	8,555
295.46	7,246	8,699
295.48	7,281	8,844
295.50	7,316	8,990
295.52	7,352	9,137
295.54	7,387	9,284
295.56	7,422	9,433
295.58	7,457	9,581
295.60	7,493	9,731
295.62	7,528	9,881
295.64	7,563	10,032
295.66	7,598	10,184
295.68	7,634	10,336
295.70	7,669	10,489
295.72	7,704	10,643
295.74	7,739	10,797
295.76	7,775	10,952
295.78	7,810	11,108
295.80	7,845	11,265
295.82	7,881	11,422
295.84	7,916	11,580
295.86	7,951	11,739
295.88	7,986	11,898
295.90	8,022	12,058
295.92	8,057	12,219
295.94	8,092	12,380
295.96	8,127	12,542
295.98	8,163	12,705
296.00	**8,198**	**12,869**

Post Development 10-17-24 *NOAA10 24-hr D 100-Year Rainfall=8.19", P2=8.23"*
Prepared by Guerriere & Halnon Inc Printed 1/8/2025

Stage-Area-Storage for Pond 2P: Infiltration Basin 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
293.00	5,409	0
293.02	5,465	109
293.04	5,521	219
293.06	5,576	330
293.08	5,632	442
293.10	5,688	555
293.12	5,744	669
293.14	5,799	785
293.16	5,855	901
293.18	5,911	1,019
293.20	5,967	1,138
293.22	6,023	1,257
293.24	6,078	1,378
293.26	6,134	1,501
293.28	6,190	1,624
293.30	6,246	1,748
293.32	6,301	1,874
293.34	6,357	2,000
293.36	6,413	2,128
293.38	6,469	2,257
293.40	6,525	2,387
293.42	6,580	2,518
293.44	6,636	2,650
293.46	6,692	2,783
293.48	6,748	2,918
293.50	6,804	3,053
293.52	6,859	3,190
293.54	6,915	3,327
293.56	6,971	3,466
293.58	7,027	3,606
293.60	7,082	3,747
293.62	7,138	3,890
293.64	7,194	4,033
293.66	7,250	4,177
293.68	7,306	4,323
293.70	7,361	4,470
293.72	7,417	4,617
293.74	7,473	4,766
293.76	7,529	4,916
293.78	7,584	5,067
293.80	7,640	5,220
293.82	7,696	5,373
293.84	7,752	5,528
293.86	7,808	5,683
293.88	7,863	5,840
293.90	7,919	5,998
293.92	7,975	6,157
293.94	8,031	6,317
293.96	8,086	6,478
293.98	8,142	6,640
294.00	8,198	6,804
294.02	8,222	6,968
294.04	8,247	7,132
294.06	8,271	7,298
294.08	8,296	7,463
294.10	8,320	7,629
294.12	8,344	7,796
294.14	8,369	7,963
294.16	8,393	8,131
294.18	8,418	8,299
294.20	8,442	8,467
294.22	8,466	8,637
294.24	8,491	8,806
294.26	8,515	8,976
294.28	8,540	9,147
294.30	8,564	9,318
294.32	8,588	9,489
294.34	8,613	9,661
294.36	8,637	9,834
294.38	8,662	10,007
294.40	8,686	10,180
294.42	8,710	10,354
294.44	8,735	10,529
294.46	8,759	10,704
294.48	8,784	10,879
294.50	8,808	11,055
294.52	8,832	11,231
294.54	8,857	11,408
294.56	8,881	11,586
294.58	8,906	11,764
294.60	8,930	11,942
294.62	8,954	12,121
294.64	8,979	12,300
294.66	9,003	12,480
294.68	9,028	12,660
294.70	9,052	12,841
294.72	9,076	13,022
294.74	9,101	13,204
294.76	9,125	13,386
294.78	9,150	13,569
294.80	9,174	13,752
294.82	9,198	13,936
294.84	9,223	14,120
294.86	9,247	14,305
294.88	9,272	14,490
294.90	9,296	14,676
294.92	9,320	14,862
294.94	9,345	15,049
294.96	9,369	15,236
294.98	9,394	15,423
295.00	**9,418**	**15,612**

NRCS Soils Report

TESTING INFORMATION

TESTING DATE: JULY 27, 2023 SOIL EVALUATOR: MICHAEL HASSETT

TP 23–1

295.85		
	SANDY LOAM 10YR3/2	0"–6" A
295.35		
	SANDY LOAM 10YR5/6	6"–30" B
293.35		
	LOAMY SAND 2.5Y5/3	30"–74" C–1
289.68		
	SANDY LOAM 2.5Y5/4	74"–132" C–2
284.85	NO REFUSAL NO MOTTLES	

TP 23–2

296.35		
	SANDY LOAM	0"–6" A
295.85		
	SANDY LOAM	6"–24" B
294.35		
	FINE LOAMY SAND 2.5Y5/2	24"–56" C–1
291.68		
	GRAVELLY LOAMY SAND	56"–96" 2.5Y5/3 C–2
288.35		
	SANDY LOAM 10YR5/4	96"–136" C–3
285.02	NO REFUSAL	

TP 23–3

295.75		
	SANDY LOAM	0"–6" A
295.25		
	SANDY LOAM	6"–36" B
292.75		
	LOAMY SAND 2.5Y5/2	36"–48" C–1
291.75		
	LOAMY SAND 2.5Y5/3	48"–96" C–2
287.75		
	SANDY LOAM 10YR5/4	96"–156" C–3
282.75	MOTTLES@48" STANDING WATER@132"	

TP 23–4

297.65		
	SANDY LOAM	0"–6" A
297.15		
	SANDY LOAM	6"–36" B
294.65		
	LOAMY SAND	36"–132" C
286.65	NO REFUSAL NO MOTTLES	

TP 23–5

301.65		
	SANDY LOAM 10YR3/3	0"–6" A
301.15		
	SANDY LOAM 10YR5/6	6"–36" B
298.65		
	LOAMY SAND ANGULAR ROCKS	36"–120" C
291.65	NO REFUSAL NO MOTTLES	

TP 23–6

299.35		
	SANDY LOAM	0"–6" A
298.85		
	SANDY LOAM	6"–30" B
296.85		
	SAND 2.5Y4/3	30"–54" C–1
294.85		
	LOAMY SAND	54"–105" C–2
290.60	NO REFUSAL NO MOTTLES	

TP 23–7

293.65		
	SANDY LOAM	0"–6" A
293.15		
	SANDY LOAM	6"–36" B
290.65		
	LOAMY SAND	36"–78" C–1
287.15		
	LOAMY SAND W/ GRAVEL	78"–128" C–2
282.98		

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Norfolk and Suffolk Counties, Massachusetts

Balsam Estates Subdivision

January 8, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

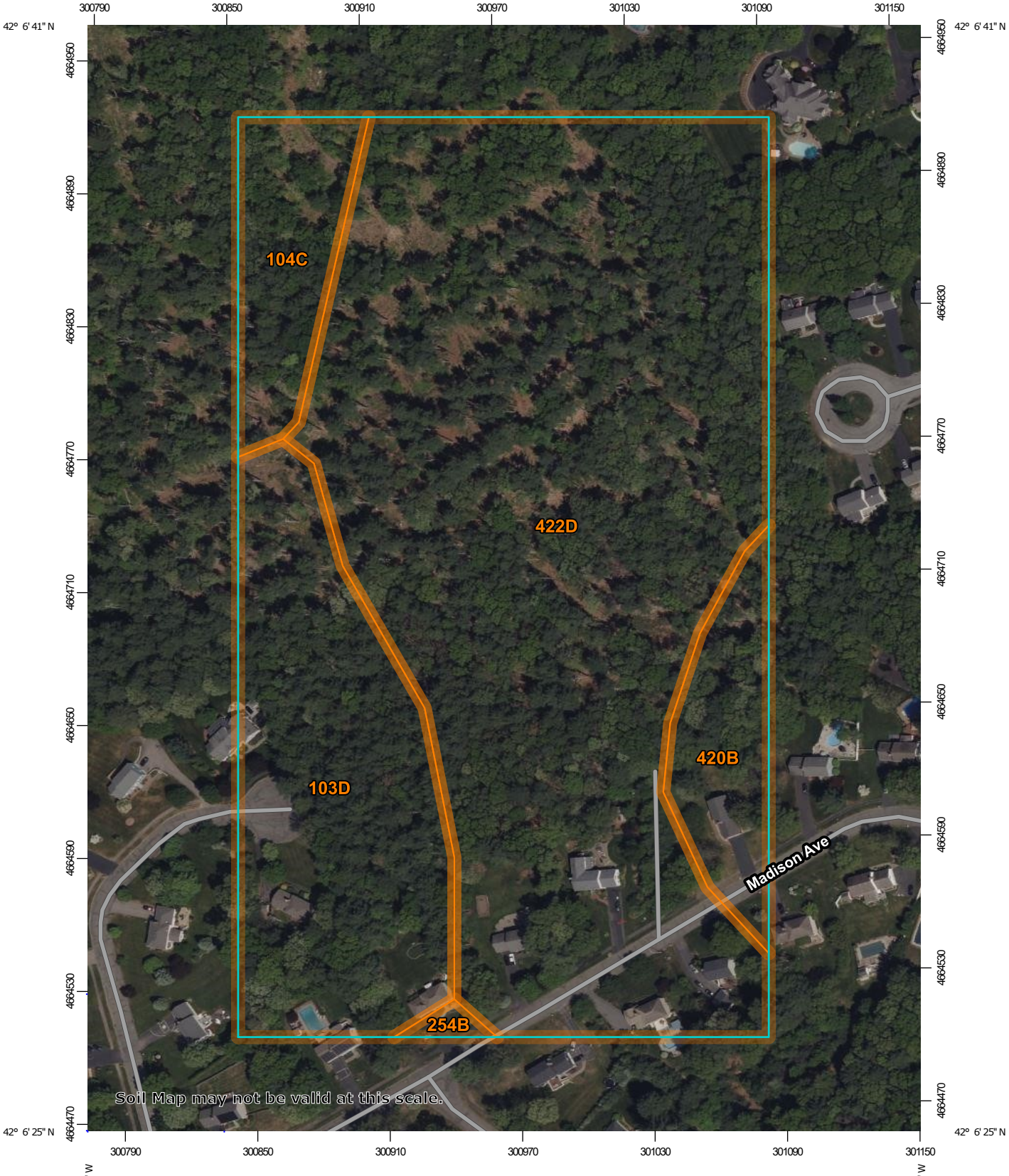
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,430 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 20, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	5.0	20.2%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	1.5	6.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.1	0.4%
420B	Canton fine sandy loam, 3 to 8 percent slopes	1.5	5.9%
422D	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	16.7	67.3%
Totals for Area of Interest		**24.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Norfolk and Suffolk Counties, Massachusetts

103D—Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: vktk
Elevation: 0 to 490 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 35 percent
Hollis and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 36 inches: fine sandy loam
H3 - 36 to 60 inches: fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous rock

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 14 inches: gravelly fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Canton

Percent of map unit: 8 percent
Hydric soil rating: No

Chatfield

Percent of map unit: 8 percent
Hydric soil rating: No

Montauk

Percent of map unit: 4 percent
Hydric soil rating: No

104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69p
Elevation: 0 to 1,270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis, extremely stony, and similar soils: 35 percent
Rock outcrop: 25 percent
Charlton, extremely stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Canton, extremely stony

Percent of map unit: 7 percent
Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 6 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Scituate, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 1 percent
Landform: Hills, recessionial moraines, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, deltas, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Walpole

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

420B—Canton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w81b

Elevation: 0 to 1,180 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Canton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Scituate

Percent of map unit: 10 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex

Hydric soil rating: No

Montauk

Percent of map unit: 5 percent
Landform: Moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton

Percent of map unit: 4 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 1 percent
Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

422D—Canton fine sandy loam, 15 to 35 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w81j
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Montauk, extremely stony

Percent of map unit: 6 percent
Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Scituate, extremely stony

Percent of map unit: 4 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Hollis, extremely stony

Percent of map unit: 4 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

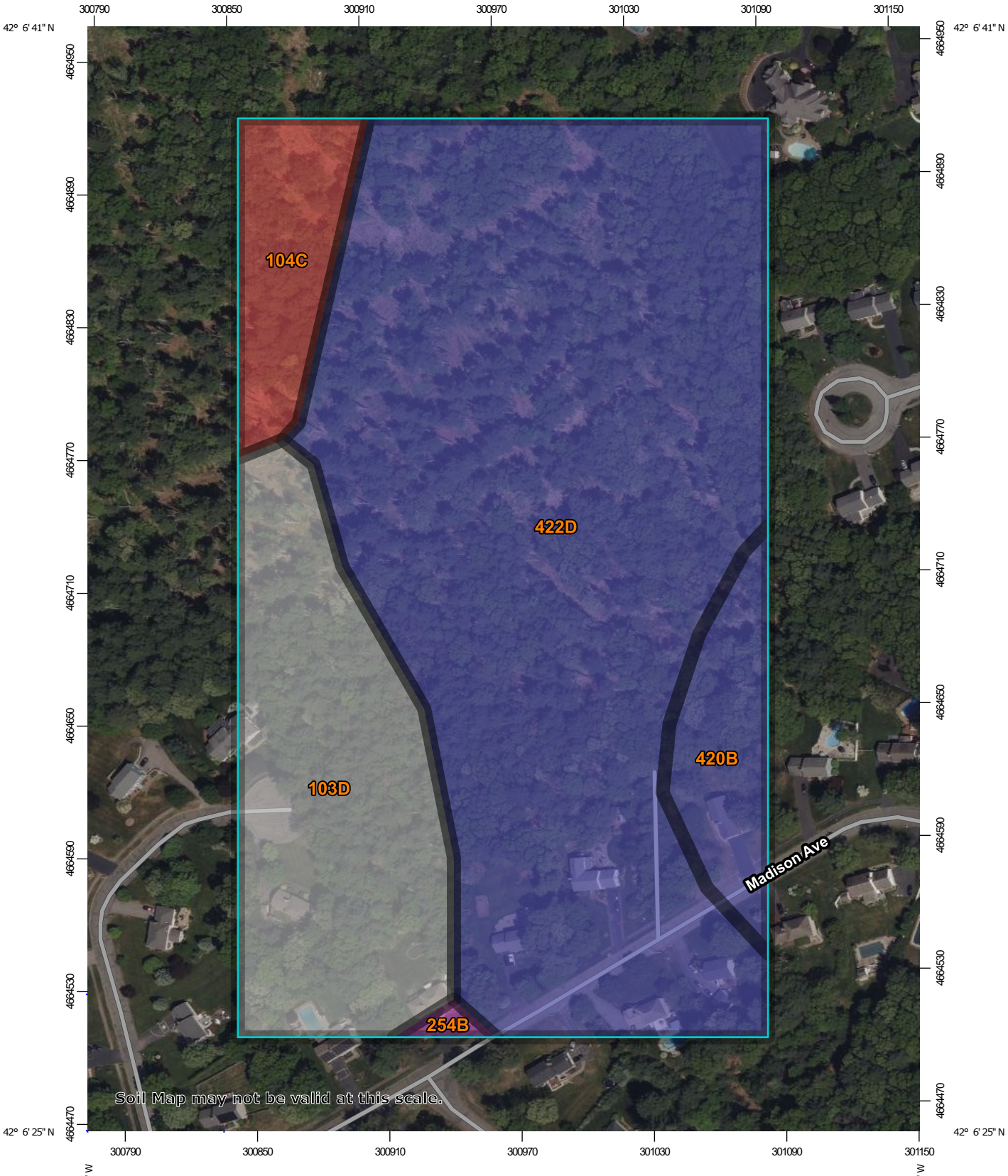
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



Map Scale: 1:2,430 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 20, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes		5.0	20.2%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	1.5	6.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	0.1	0.4%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	1.5	5.9%
422D	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	B	16.7	67.3%
Totals for Area of Interest			**24.8**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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TSS Removal Worksheet

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Balsam Estates, Franklin MA - Basins #1 & 2

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin	0.80	1.00	0.80	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: F-4631

Prepared By: Michael Hassett

Date: 1/8/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Inspection Forms

Post Construction Inspection Report
Balsam Estates
Franklin, Massachusetts

INSPECTION DATE:						
Person Inspecting		Weather				Other Personnel Present
		Clear				
Item	**N/A***	**sat.****	**NMR*****	**CAM****	**MCA***	**Comments:**
Pavement Swept						
Infiltration Basin #1						
Infiltration Basin						
Overflow Spillway						
Infiltration Basin #2						
Infiltration Basin						
Overflow Spillway						
NMR* normal maintenance requested						
N/A* not applicable at the time of inspection						
CAM* corrective action - minor						
SAT* satisfactory conditions as compliant						
MCA* Major corrective action						